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AMERICAN

DYESTUFF REPORTER

AL PUBLICATION
of the
OCEEDINGS
AN ASSOCIATION
XTILE CHEMISTS
D COLORISTS

When "Life" is Important

There is no denying that those who remain on the Home Front require constant stimulation — the kind of stimulation which only "lively" color can cause.

For ladies' wear, what greater "life" and durability are obtainable with Geigy's

Polar Brilliant Colors!

When Life Is Important

The scourge of Typhus has ever plagued armies. Whole armies have been wiped out in the past. Today our men are successfully being protected against Typhus by a *Neocid* composition of DDT discovered by Geigy.

Malaria has plagued our armies in the South Pacific. Today the incidence of Malaria has been cut 75% by the use of another *Neocid* composition.

Geigy is proud of its part in the protection of the health of the armed forces.

GEIGY COMPANY, INC.

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Geigy
Dyestuff Makers Since 1859

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The Geigy Colour Co., Ltd.
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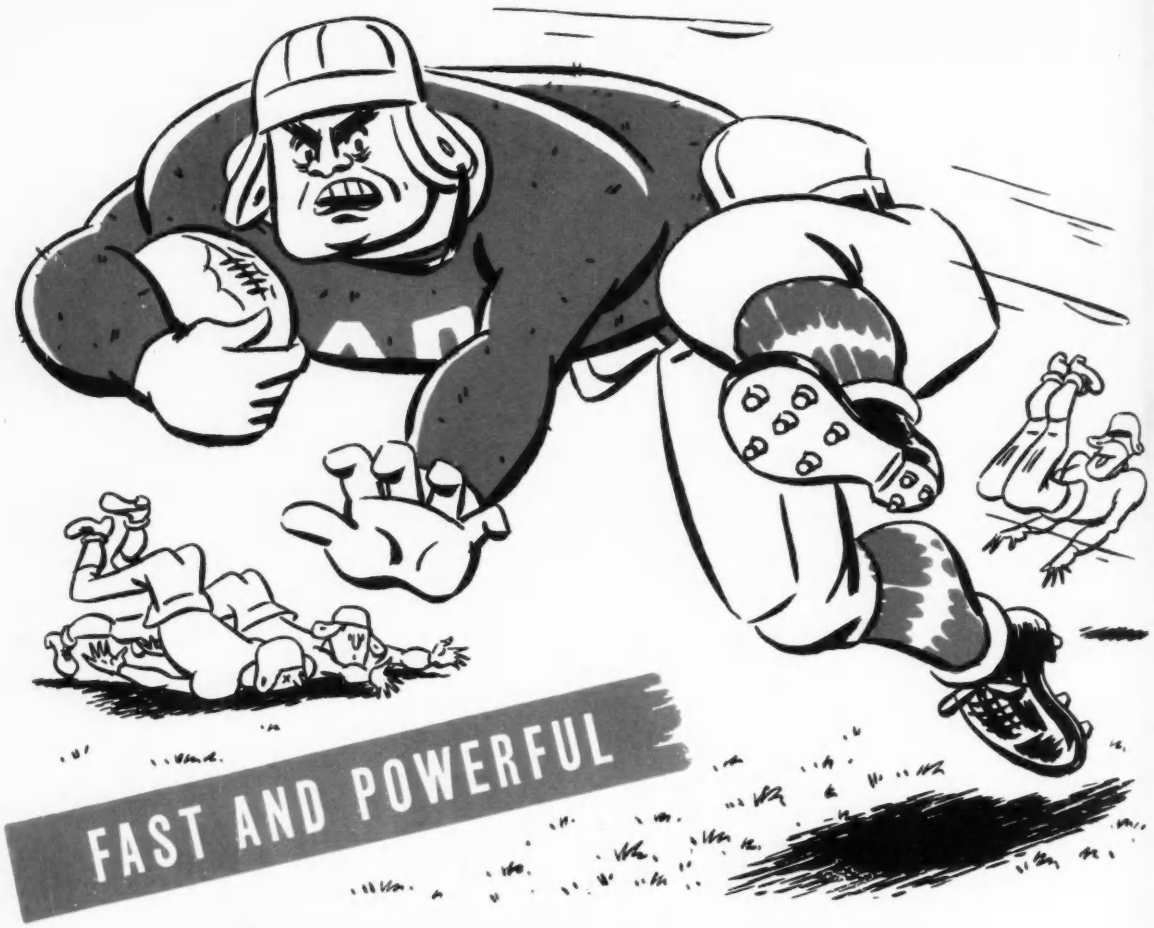

Use DECERESOL* OT

THE SPEEDIEST WETTING AGENT AVAILABLE FOR TEXTILE PROCESSING

DECERESOL OT covers a lot of territory in textile processing. It saves you time, cuts costs and improves production in at least thirty different applications because of its remarkably fast and powerful wetting, penetrating, dispersing and dye leveling properties.

DECERESOL OT can be added directly to the wet processing bath without preliminary make-up or manipulation. That means speed of application as well as speed of action.

Write to Cyanamid for further information on DECERESOL OT, or ask our representative to show you how and where it can improve the efficiency of your production.

DECERESOL OT is shipped in standard 55-gallon stainless steel drums having an exact net weight of 450 pounds, or in 12-gallon boxed carboys with an exact net weight of 100 pounds.

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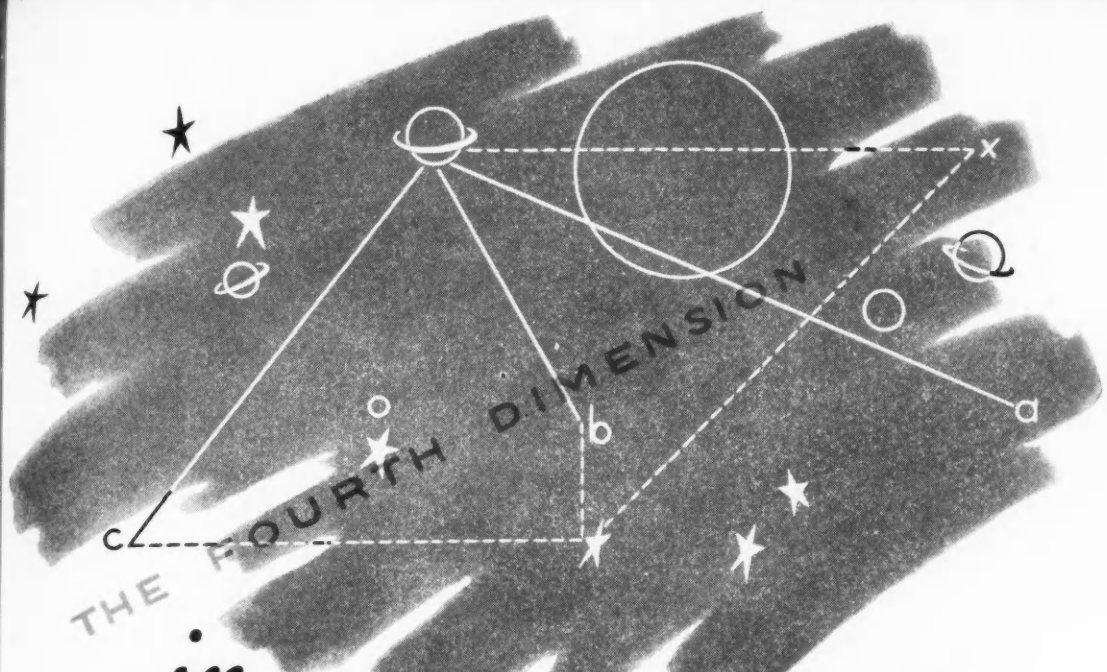
MANUFACTURERS OF
SULPHONATED OILS • PENETRANTS • SOFTENERS
FINISHES • SIZING COMPOUNDS • DECERESOL* OT
WETTING AGENTS AND OTHER SPECIALTIES FOR THE TEXTILE INDUSTRY.

**Reg. U. S. Pat. Off.*



in COLOR...

Relativity? No . . . just the application of unceasing research into the new chemistry constantly developing . . . analysis of formulae to anticipate new textiles, new uses, new needs in color. These constitute the fourth dimensions of our efforts for you, for the dyestuffs of tomorrow.

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VAT DYES OF THE DOW CHEMICAL COMPANY

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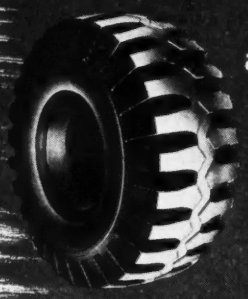
VERSA *tility*

Every day, Industrial's textile experts and technicians are discovering new possibilities with their brain-child, "The Continuous Process."

On the one hand, we are producing rayon yarns of a denier sturdy enough for super-strength TIRE CORD—

***TYRON** is its name.



and . . . . . On the other hand, the "Continuous Process" is capable of making a gossamer yarn for the daintiest cobweb of a fabric. This yarn, in textile sizes, is the famous

***Spun-lo**

Strong, uniform, knot free yarn is the secret of good tire cord.

"Continuous Process" machines, Industrial's exclusive development, produce it perfectly.

and . . . . . Strong, uniform, knotfree yarn is the secret of an exquisite dress material. The "Continuous Process" produces that, too. Not much now (war work, you know) but this is the time to learn the characteristics of "Continuous Process" *Spun-lo.

*Reg. U. S. Pat. Off.

CLEVELAND, OHIO • *New York Office, 500 Fifth Avenue*

The Dye That Makes Your Gall Bladder Photogenic

. . . NEO-TETRADOL

When a doctor orders X-Rays for the diagnosis of an abdominal ailment, he will most likely prescribe NATIONAL NEO-TETRADOL to opaque the gall bladder and define it sharply upon the X-Ray negative.

NEO-TETRADOL is only one more of the many developments of NATIONAL TECHNICAL SERVICE in the application of dyes, intermediates and synthetic organic chemicals. *It is typical of NATIONAL'S thoroughgoing research . . .* research that has been responsible for the development of NACCONOL, the leading synthetic organic detergent, new synthetic coating-resin chemicals, as well as better textile dyes, biological stains, food, drug, cosmetic and other specialized colors.

Why not make use of this wealth of scientific and industrial data and its practical application to your problems by NATIONAL TECHNICAL SERVICE?

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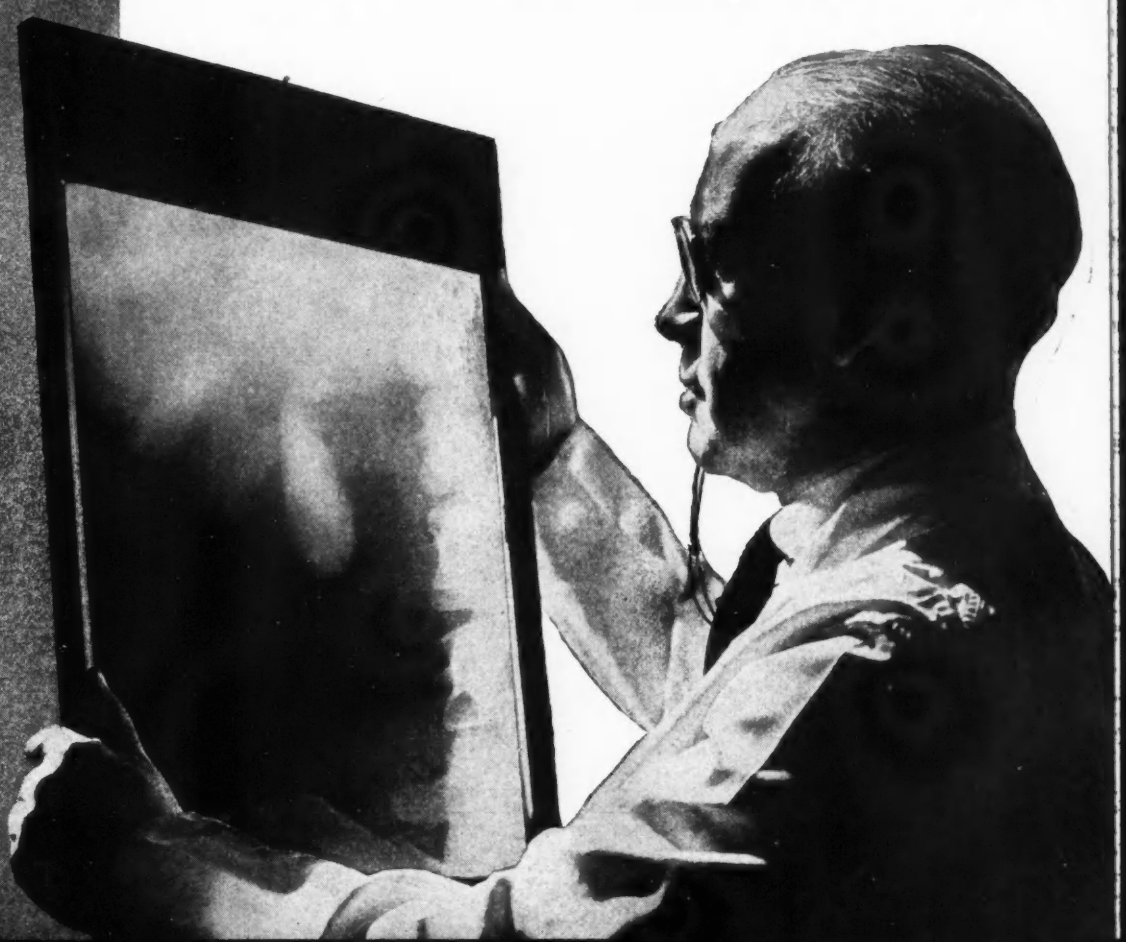

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A complete line of finishes of exceptional merit for the production of hosiery to meet the most discriminating tastes.

Inquiries are solicited

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JERSEY CITY, N. J.

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FAST COLOR SALTS AND BASES

For color range . . brilliancy . . excellent fastness properties . . high yield . . low cost . . flexibility of application and economical production NAPHTOLS are unchallenged in their field.

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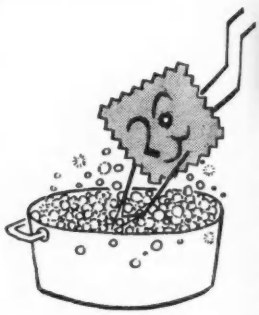
Casablanca's New Rayon Sheer Found Hand Washable by all "CROWN"* Tests

No. 36 of a series—from our files on the new CROWN Tested Plan

THIS IS THE STORY of a rayon fabric with a dual personality. In appearance, it's sheer, delicate, glamorous. But in actual use... in wear and in washing... it's a fabric that's really practical.

It's Casablanca Fabric Company's "Wispy Sheer"... developed in conjunction with our Fabric Development Department from our special 1.25 denier rayon staple. Casablanca, a converter who is always on the watch for better fabrics, decided to have this spun viscose sheer finished to meet CROWN Tested hand washable requirements. So the dyeing and finishing was turned over to Allied Textile Printers...and a splendid job they did. The very first sample tested showed that this cloth had all these "amber light" characteristics:

It can be washed by hand at 105°F. It resists fading from sunlight, atmospheric fading and perspiration staining. And thanks to its crisp, durable finish, it keeps its good looks through many launderings.



So "Wispy Sheer" now sells under the CROWN Tested Amber Tag. It makes dresses and blouses in white and in lovely pastel shades . . . the kind women go for in a big way. And there's no doubt about their serviceability . . . for the tag tells consumers they are *truly* hand washable.

Perhaps you too have an outstanding rayon fabric. If you want to establish its reputation, dramatize its performance . . . why not do it the CROWN Tested way?

NEW INFORMATIVE LABELING
CONSUMER SATISFACTION UNDER THE THREE TAG SYSTEM

"Crown" Tested Rayon Fabric

A better way to buy rayon fabrics—This identification is awarded only to fabrics containing CROWN Rayon, after they have passed the CROWN Tests for serviceability. These tests predict the fabric will not change visibly in color or in texture, nor in size more than 2%, if instructions are followed. Samples of every dye lot of fabric have been tested against minimum requirements set and maintained by

AMERICAN VISCOSE CORPORATION

Producer of CROWN *Rayon Yarns and Staple Fibers*

Sales Offices: 350 Fifth Avenue, N. Y. C. 1; Providence, R. I.; Charlotte, N. C.; Philadelphia, Pa.

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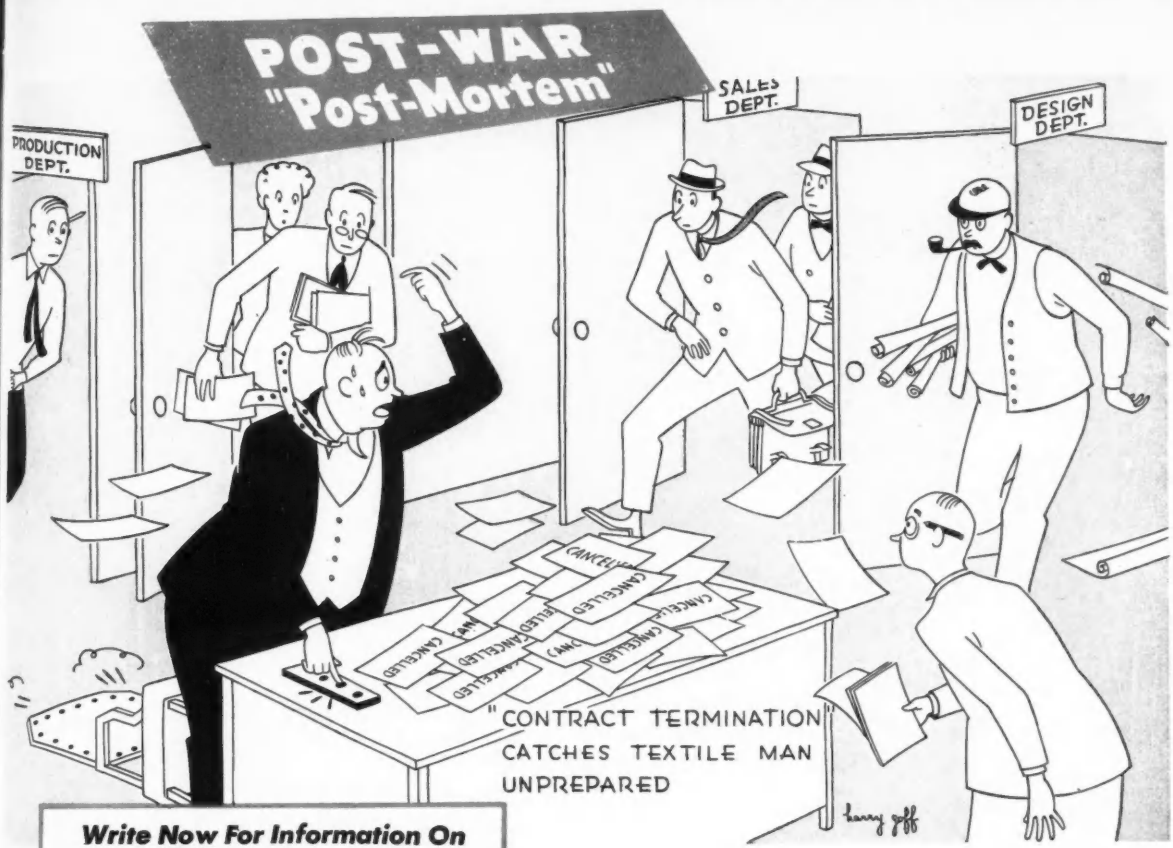
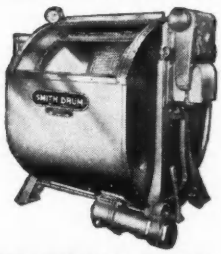
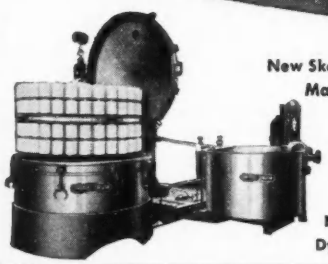


Write Now For Information On These Smith-Drum Machines



Rotary Hosiery Dyeing Machines



New Skein Dyeing Machine

New Package Dyeing Machine

Cancellation of government contracts will demand swift action in switching to full scale peace-time production if the textile industry is to avoid serious losses. The textile man who delays any longer in making his plans for new products, marketing, sales, and *production facilities* is inviting trouble and confusion.

But "contract terminations" hold no fears for the man who plans ahead. One of the most important things to do, and something that can be done *right now*, is to check your production equipment and take steps to put your entire plant in first-class operating condition. You will probably need some new machines because a large percentage of *all* textile machines now in use are worn to the point where they can no longer produce efficiently. Decide what new equipment you must purchase.

And here is the important part: Order those machines immediately! Machinery manufacturers already are filling their books with advance orders for post-war delivery. It will take us a long time to catch up with the demand, once war restrictions are lifted. Any further delay in ordering new equipment will mean *waiting for delivery months after the war is over* . . . while longer-sighted competitors profit from the lower production costs made possible by new machines they ordered *now*.

Our "Post-War Purchase Plan" is designed to help far-sighted textile men plan ahead . . . *without risk!* Ask us for details.

SMITH, DRUM & COMPANY
Allegheny Avenue at 5th Street, Philadelphia 33, Pa.

ARMY E NAVY

SMITH-DRUM TEXTILE MACHINES

for hosiery dyeing, skein dyeing, package dyeing, beam dyeing, piece goods dyeing, package drying, skein mercerizing, warp mercerizing, hosiery inspection.

—when you print with

ARIDYE PIGMENT COLORS

Pioneering with Pigments

—one of a series of developments illustrating the advantages of Aridye* pigment colors in new and significant applications.

Millions of yards of cloth have been printed with remarkable uniformity with Aridye colors. Aridye colors print in the final shade. They do not need to be developed by chemical after-treatment—with all the possibilities of shading from side to side or piece to piece because of variations in the conditions of after-treatment.

Aridye colors—the first pigment colors to meet the needs of the textile industry—were first introduced for printing cotton shirtings and dress goods. Because of their uniformity, light fastness and other advantages, they are now being used with outstanding success on cotton, rayon, acetate, Fiberglas† and mixtures of these fabrics.

Aridye Corporation, as a part of the Interchemical group, has had many years of experience in the application of pigments to paper, carton stock, cloth bags, waxed paper, metals, and plastics. Their extensive research has resulted in the development of extremely lightfast pigments. Aridye colors may now be selected which, even in light tints, will withstand 300 hours in the Fade-Ometer without let down. And in washfastness, Aridye colors meet or exceed accepted standards of the textile industry.

Investigate the full advantages that Aridye pigment printing colors offer *you!* Write today to Aridye Corporation, a subsidiary of Interchemical Corporation, Fair Lawn, New Jersey.

*Reg. U. S. Pat. Off.
†Reg. U. S. Pat. Off.
Owens-Corning-Fiberglas Corporation

Aridye TEXTILE COLORING MATERIALS

ARIDYE CORPORATION • SUBSIDIARY OF INTERCHEMICAL CORPORATION • FAIR LAWN, N. J. • ROCK HILL, S. C. • PROVIDENCE, R. I.

General Chemical "B&A" Reagent Acids and Ammonia

Quality in quantity shapes success...increases product potentialities. That's why, wherever *reagent grade mineral acids or ammonia in commercial quantities* are specified for industrial operations, General Chemical "B&A" high purity products are an outstanding choice nation-wide.

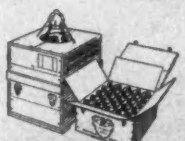
These reagents from America's foremost producer of mineral acids conform to exacting A.C.S. specifications. Their quality and purity are the result of General Chemical's progressive research and advanced reagent production technique, combined with invaluable "know-how" gained during almost half a century's manufacture of basic chemicals for industry.

Specify and rely on General Chemical "B&A" Reagent Acids and Ammonia for your operations. Remember...their dependability has been "proved in production" by America's leading manufacturers!

General Chemical Reagent Acids and Ammonia are produced by the Company's Baker & Adamson Division, makers of laboratory reagents and fine chemicals since 1882. The experience of this Division with high quality chemicals embraces over 1,000 purity products.

• • •

"B&A" Sulfuric Acid, Reagent, A.C.S.
Sp. Gr. 1.84
"B&A" Hydrochloric Acid, Reagent, A.C.S.
Sp. Gr. 1.18–1.19
"B&A" Nitric Acid, Reagent, A.C.S.
Sp. Gr. 1.42
"B&A" Ammonium Hydroxide, Reagent, A.C.S.
Sp. Gr. .90
"B&A" Acetic Acid Glacial, Reagent, A.C.S.



Quantities: "B&A" Reagent Acids and Ammonia are available in carboys as well as in five-pint or one-pound bottles, which are obtainable in case lots or less.

• • •

Stocked at key locations throughout the nation.

GENERAL CHEMICAL COMPANY
40 RECTOR STREET, NEW YORK 6, N. Y.

Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) • Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver Detroit • Houston • Kansas City • Milwaukee • Minneapolis • New York Philadelphia • Pittsburgh • Providence (R. I.) • St. Louis • Utica (N.Y.)

Pacific Coast Technical Service Offices:
Los Angeles • San Francisco • Seattle, Wenatchee and Yakima (Wash.)

In Canada: The Nichols Chemical Co., Ltd. • Montreal • Toronto • Vancouver

There's no Scarcity of Hooker Quality

Here's where Hooker can help you. Whenever you get a shipment of Hooker chemicals, you can be sure that it is of the same uniformly dependable high quality it has always been—made with the same high standard of purity which you have come to expect from Hooker. In fact, it's because we are determined to maintain this high standard that shortages sometimes occur.

Among the Hooker chemicals important to dye and textile chemists the four following are readily available in the quantities you need. If you are not now using them, a request on your letterhead will bring samples and further data.

ALUMINUM CHLORIDE, ANHYDROUS, $AlCl_3$, a gray crystalline solid available in 3 screen sizes. Soluble in Nitrochlorbenzene, Orthonitrochlorbenzene.

ANALYSIS

$AlCl_3$	99% min.
Fe	0.10% max.
Shipping Containers	Pails 50 lb. net
	Drums 500 lb. net

MONOCHLORTOLUENE (METHYLCHLORBENZENE), $CH_3C_6H_4Cl$, a clear colorless liquid insoluble in water, soluble in alcohol and ether.

BOILING RANGE	158 to 165°C
SPECIFIC GRAVITY	
at 15.5°C	1.080 ± .005
Shipping Containers	Cans 44 lbs. net
	Drums 450 and 900 lbs. net

SODIUM SULFIDE, Na_2S, a light yellow colored solid in flake form, soluble in water, slightly soluble in alcohol, insoluble in ether.

ANALYSIS

Na_2S	60 to 62%
NaCl	1.5% max.
other Na Salts	2.0% max.
Fe	10 to 15 ppm
Cu, Ni, Cr, Mn, Pb	1 ppm max.
Water of crystallization	36.5 to 34 %
Shipping Containers	Drums 90 and 350 lbs. net

SODIUM SULFHYDRATE, NaSH, a light yellow colored solid in flake form. Soluble in water and alcohol, insoluble in ether.

ANALYSIS

NaSH	70 to 72%
NaOH	0%
Na_2S	0%
NaCl	1% max.
Na_2SO_3, $NaHCO_3$	1% max.
Fe	5 ppm max.
Cu, Ni, Cr, Mn, Pb	1 ppm max.
Water of Crystallization	28 to 26%
Shipping Containers	Drums 90 and 350 lbs. net

ARMY E NAVY

OTHER HOOKER CHEMICALS FOR THE TEXTILE INDUSTRY

Antimony Trichloride, Anhydrous
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Benzoyl Chloride
Benzyl Chloride
Caustic Soda
Chlor Anisidine
2:5 Dichlor Aniline
Liquid Chlorine
Metanitrobenzoyl Chloride
Monochlorbenzene
Orthodichlorbenzene
Paradichlorbenzene
Paranitrobenzoyl Chloride
Phosgene
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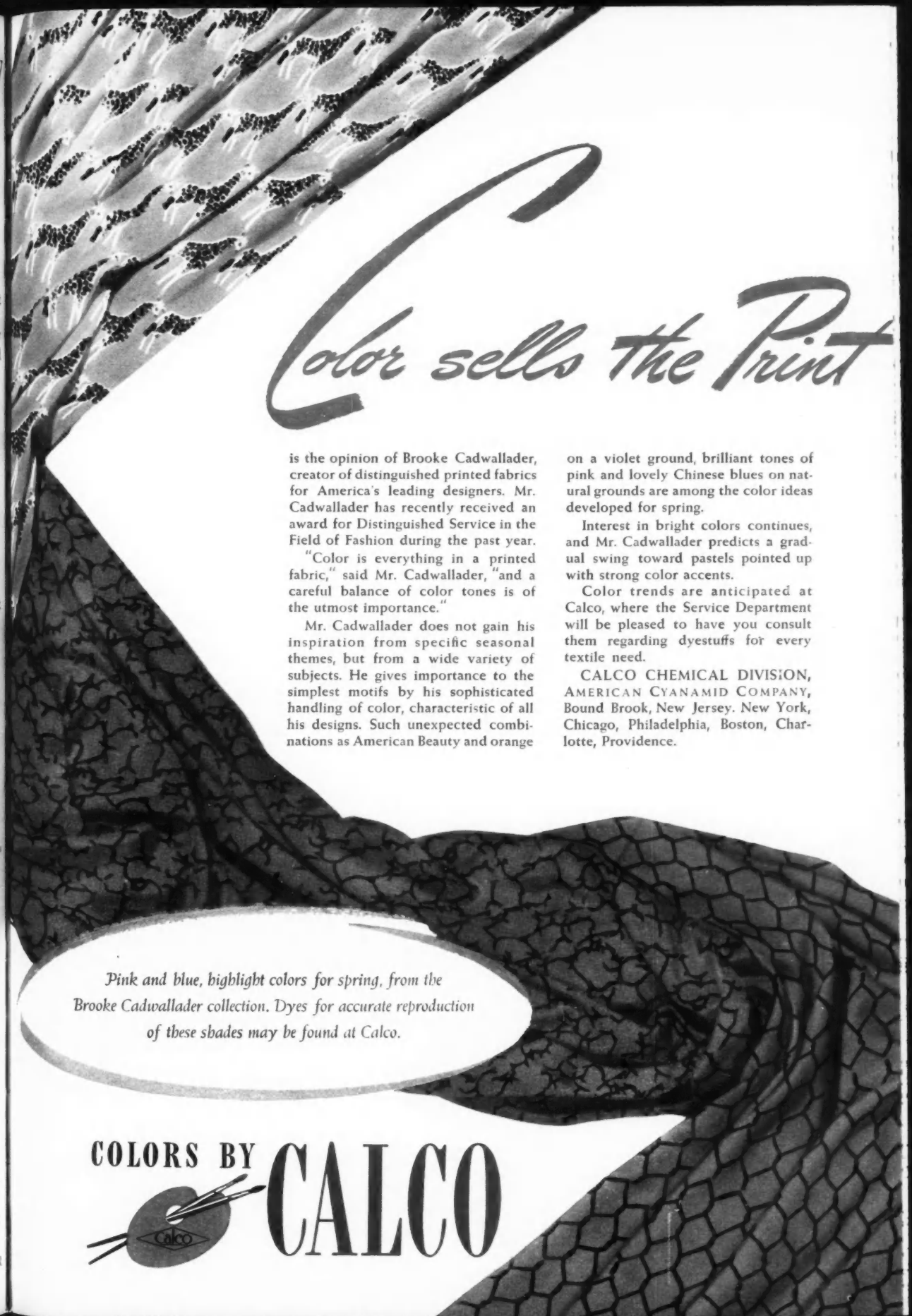
CHLORINE **CAUSTIC SODA** **BLEACHING POWDER** **MURIATIC ACID** **FERRIC CHLORIDE**



Color sells the Print

is the opinion of Brooke Cadwallader, creator of distinguished printed fabrics for America's leading designers. Mr. Cadwallader has recently received an award for Distinguished Service in the Field of Fashion during the past year.

"Color is everything in a printed fabric," said Mr. Cadwallader, "and a careful balance of color tones is of the utmost importance."

Mr. Cadwallader does not gain his inspiration from specific seasonal themes, but from a wide variety of subjects. He gives importance to the simplest motifs by his sophisticated handling of color, characteristic of all his designs. Such unexpected combinations as American Beauty and orange on a violet ground, brilliant tones of pink and lovely Chinese blues on natural grounds are among the color ideas developed for spring.

Interest in bright colors continues, and Mr. Cadwallader predicts a gradual swing toward pastels pointed up with strong color accents.

Color trends are anticipated at Calco, where the Service Department will be pleased to have you consult them regarding dyestuffs for every textile need.

CALCO CHEMICAL DIVISION, AMERICAN CYANAMID COMPANY, Bound Brook, New Jersey. New York, Chicago, Philadelphia, Boston, Charlotte, Providence.

Pink and blue, highlight colors for spring, from the Brooke Cadwallader collection. Dyes for accurate reproduction of these shades may be found at Calco.

COLORS BY CALCO

Calcomet dyes have streamlined the application of chrome colors to wool by reducing the time cycle. Through this new, scientifically evolved, improved metachrome process, it is now possible to achieve the time-saving and close color control features of the metachrome process, and at the same time retain the advantages of levelness, fastness, and the ability to produce rich, heavy-bodied shades characteristic of the other chrome dyeing methods.

The use of Calcomets involves a new dyeing technique, developed after careful laboratory research and proved in actual test runs in leading mills. The process is flexible and lends itself to the many and varied machines now employed for dyeing wool.

Calcomet dyes are available in eleven shades, including Calcomet Black J., a full jet black, produced for the first time with metachrome dyes.

See your Calco representative regarding a demonstration. Calco Technical Service is available for assistance in initial dyeings. CALCO CHEMICAL DIVISION, AMERICAN CYANAMID COMPANY, Bound Brook, N. J., Chicago, New York, Philadelphia, Boston, Charlotte, Providence.

PATENTS COVERING THE METHOD AND THE CALCOMET DYES HAVE BEEN APPLIED FOR

CALCOmets

DEVELOPED FOR *Postwar* ...BUT *Available Now!*

New Synthetic Wetting Agents of Exceptional Efficiency and Versatility:

QUAKER DIANOLS

DEVELOPED for postwar sale, these outstanding products of Quaker Research are now available in large quantities . . . thanks to earlier-than-expected release of raw materials.

To the best of our knowledge, the new DIANOLS are the most efficient wetting agents on the market, based upon applied cost.

They are non-volatile at the drying temperatures used for textile processing, so are outstanding *re-wetting* agents. This characteristic makes them uniquely satisfactory and efficient for the sanforizing process.

Subsequent announcements will present detailed data on the individual Quaker DIANOLS. Some of their outstanding characteristics are:

- **Most efficient on the basis of applied cost.**
- **Applicable to all phases of wet textile processing requiring a synthetic wetting agent of high quality and low applied cost.**
- **Stable and effective in solutions of 1-12 pH.**
- **Are excellent sanforizing and rewetting agents.**
- **Stable and effective in hard or soft water and over a wide range of temperatures.**
- **Do not discolor white goods or alter shades.**
- **Rapidly wet out cotton, wool, rayon or acetate fabrics.**

QUAKER CHEMICAL PRODUCTS CORP.
CONSHOHOCKEN, PA.

Other Plants in CHICAGO and DETROIT Warehouse Stocks in Principal Industrial Centers

A Progressive Organization of Research and Process Engineers and Manufacturing Chemists

For more information on QUAKER DIANOLS, fill in below, tear out and mail.

Name_____ Position_____

• • • PLEASE PRINT COMPANY NAME AND ADDRESS IN MARGIN BELOW • • •

Brightness and Economy are Characteristics of

Pharmasol Golden Yellow N

PHARMASOL Golden Yellow N produces clear, bright, fast and economical golden yellow shades when printed on cottons or rayons.

When mixed with Pharmasol Scarlet GNN, or Pharmasol Red GNN, a complete range of Tangerine and Gold Shades can be obtained.

Low cost Browns are obtained by mixing with either Pharmasol Blue GNXX or with Pharmasol Blue GDNN.

PHARMASOLS are solutions of stabilized azoic dyes and adjusted to the most practical concentration which can be easily applied with a maximum of efficiency.

PHARMASOLS solve the problem of troublesome dissolving and the uncertainties thereof—and as there is no decomposition there can be no loss of material or value.

Wide Range of use is Big Feature of

Indigosol Golden Yellow IGK

THE present price of Indigosol Golden Yellow IGK makes possible the use of this very fast Indigosol for economical dyeing and printing operations.

In combination with Indigosol Green IBA, very fast green shades are now available to the printer and dyer for the first time at a very reasonable cost.

An excellent printing color on cotton and rayon, it is also of great interest to the dyer of cotton, rayon and wool.

In ease of application, the perfectly level shades obtained, and the unusually excellent penetration of heavy goods makes the entire line of INDIGOSOLS especially valuable to the fast color dyer or printer.

CARBIC COLOR AND CHEMICAL CO., INC.

451-453 Washington Street, New York City

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AMERICAN DYESTUFF REPORTER

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Calendar of Coming Events P500

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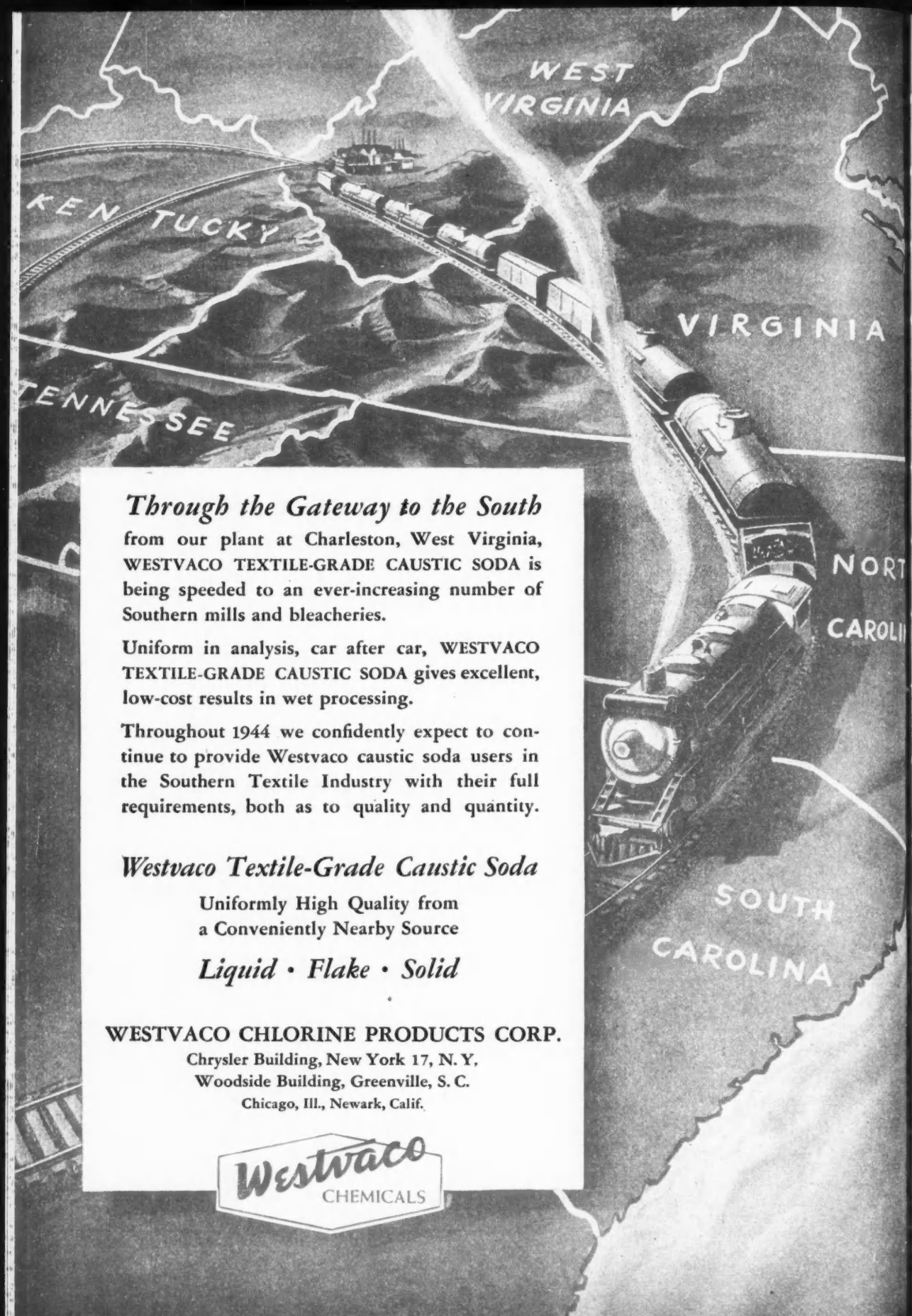

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NOVEMBER 20, 1944

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TESTING GROUP MEETING*

CHARLES W. DORN
Chairman

CHAIRMAN DORN: Without further ado I want to introduce the first speaker, Dr. Jules Labarthe, Jr., who will give a paper on the "Service Testing of Textile Materials."

Dr. Labarthe!

. . . Thereupon Dr. Labarthe presented his prepared paper . . .

SERVICE TESTING OF TEXTILE MATERIALS*

JULES LABARTHE, JR.

THIS very large subject will be dealt with in several ways by other speakers this morning. I shall approach it primarily as a technologist working for the customers of a retail establishment. The history of the Kaufmann Department Store's Multiple Fellowship at Mellon Institute is similar, I think, to that of the laboratories engaged in research, testing, and analytical programs for other similar organizations. Originally the purpose was to help the store buyers in their appraisal of competitive products offered to them. Very soon we all found ourselves to be serving in the interest of that segment of consumers represented by the customers of whatever store or mail order house whose laboratory work we performed. This was a natural transition because the questions we asked ourselves and the manufacturers were identical with those of our customers. It is no longer sufficient to depend entirely upon the test methods one branch of industry may use when purchasing goods from another. We are concerned with garments, shoes, electrical apparatus, blankets, cosmetics, cleaners, and all sorts of finished merchandise ready for sale to the ultimate consumer, the store customer. Of course tensile strength; color fastness to washing, light and other use conditions; shrinkage or extension; yarn count; and fiber identity are important but other use characteristics are often of equal value.

STANDARD TEST METHODS

In 1941 I was a member of a subcommittee of the Advisory Committee on Ultimate Consumer Goods that polled 140 laboratories in order to find out the extent to which they used the standard test methods of the A. A. T. C. C., A. S. T. M., or those printed in CS-59-39. Only 40 laboratories replied in sufficient detail.

Very briefly the results were as follows:

1. Relatively simple, long established standard methods were widely used by all these laboratories.

2. Determinations having to do with consumer use or for the evaluation of special features were not used generally even where a standard method had been established. The store technicians and some of the commercial testing laboratories reported that they had worked out their own methods of evaluation. University and other school laboratories expressed a lack of faith in these standard procedures dealing with tests for use performance.

3. Conditions of use for which more test development was desirable, despite the existence of standard procedures in some of them, were as follows:

a. Wear tests (abrasion)

b. Water repellancy

c. Aging

d. Thermal transmission

e. Special finishes (crease resistance, mildew, etc.)

f. Moisture absorption

g. Snag resistance

h. Fume fastness

i. Moth protection

j. Shifting or slipping of yarns.

Remember, this was in 1941, but has the situation changed much since then?

INFORMATION DESIRED BY CONSUMERS

During the years since we entered the war our own experience has been that customers still want to know,

How will a garment wear?

How warm is this coat?

How cool is that summer suit?

How will sun affect the color and life of this curtain?

Will this weave snag?

How seriously will this blouse fabric shift?

How strong is this seam?

We want to be able to answer those questions and too often we can only express the results in relative terms, that is, that one manufacturer's product is better than another. Store laboratories are not in as good a position to answer many of those questions today as they were in the spring of 1941 because many of our private brands backed by our own specifications have gradually disappeared and the quality of most textile products, as all of you know, has suffered. This condition is temporary and it is the job of all of us to re-study some of these problems. Laboratory methods of appraisal are the quickest and most readily reproducible even though we are trying to find out how to field-test a fabric for wear.

Of all the technically trained people in the A. A. T. C. C., the store laboratory chemist is closest to the consumer. Perhaps some of the most common adjustment complaints of store customers will shed additional light on this topic. This list is gleaned from a 3-month survey made this summer of 400 customer complaints sent to our laboratory. A survey of this kind may be regarded as a subjective field observations under uncontrolled, almost chaotic conditions.

1. Colors on rayons and cottons; fugi-

Charles W. Dorn, Director of Research and Testing Laboratory, J. C. Penney Co., Inc., New York, N. Y., received his B.S. from the University of Louisville in 1918 and spent the following year in the Army teaching for the Army at Pennsylvania State College. When mustered out he continued teaching at Penn State until 1920. From 1920 until 1929 he served as chief chemist for two cosmetic firms and in 1929 joined J. C. Penney Company to handle their private brand of cosmetics and to develop a research and testing laboratory. This work has been in progress to date.

Mr. Dorn is chairman of committees in A.S.T.M. and the National Retail Dry Goods Association, and a member of the Advisory Committee on Ultimate Consumer Goods of the ASA.

* Presented at Annual Meeting on October 14, 1944 in Atlantic City.

tive not only to washing, but even to cold distilled water.

2. Poor thread.

3. Fume fading.

4. Shifting and slippage of yarns; especially in blouses in the $3.95 to $5.95 price range.

5. Damage caused by careless use of antiperspirants.

6. The almost universal disregard of the F. T. C. Rayon labeling rules leading to damage in ironing, too rigorous washing, improper end use of rayon fabrics, and other uneconomic results.

7. Skin irritation from new finishes.

It is interesting to note that, in this group of 400 cases sent to the laboratory as a result of a directive from the executives of the store, the customer was at fault in only 120 or 30 per cent. Normally, in the case of complaints sent out voluntarily by buyers and section managers, the customer is at fault about 66 per cent of the time. Part of this difference is due to deterioration; part of it, too, is because many of these complaints would have been settled at once without the laboratory ever having seen them. In at least a dozen cases a whole shipment (whatever was left of it) was ordered off sale.

MILITARY REQUIREMENTS

During the present war, Joe, the man in uniform, has been the consumer for whom and by whom most textile products have been tested. Please do not overlook the words "for whom and by whom."

The demand for better wearing and more protective clothing, tentage, blankets and other textile products, as well as shoes, cooking equipment, and nearly everything else worn or used by our fighting forces, has accelerated a new technique of testing—the controlled and carefully observed wear or use test. This field test method offers us a challenge.

In general this type of test may be broken down into 3 sub-groups.

1. Tests on few subjects—conditions rigidly controlled and results carefully observed.

2. Tests with more subjects—conditions moderately controlled and observations carefully made.

3. Tests with many subjects—conditions of field use or simulation thereof and observations usually subjective in nature.

The first grouping is particularly valuable in observing and measuring the effect of various clothing items on the man. These are the physiological laboratory techniques wherein various clothing assemblies, experimental weaves, or specific finishes are evaluated for their effect on the wearer under a climatic extreme. The information derived from such cold room or jungle chamber experimentation is of value to the textile technologist even though in normal times few if any of the peace-time consuming public will ever be buying clothing for such extreme conditions. The technique is not one to be employed by the textile chemist, for the observations, measurements and analysis of data are largely physiological and medical in nature.

Jules Labarthe, Senior Fellow, Mellon Institute of Industrial Research, Pittsburgh, Pa., was born in British Columbia and received his education in the U. S. He graduated from the University of California in 1922, majoring in chemistry. Since then he has been at the Mellon Institute of Industrial Research in Pittsburgh. In 1931 he received his Doctor of Philosophy degree in chemistry at the University of Pittsburgh. For the last 14 years he has served as Senior Fellow on the Fellowship maintained by the Kaufmann Department Store.

The other two techniques augment the laboratory testing and inspection by the quartermaster depots and primarily determine the effect of man on the clothing. If the observation is sufficiently keen, data correlating the physiological laboratory experiments may be expected also. The textile technologist whether he represents a manufacturer, a retailer, a commercial laboratory or a technical society cannot afford to overlook these new research and testing tools. Of special value is the controlled use of wear test methods employed by the Quartermaster Board, Camp Lee, Virginia and by the test boards of other branches and services of our Army and Navy.

ARMY FIELD TESTS

Some of you may already be familiar with the Combat Course, the Shoe Track, and the very recently developed Rain Course at Camp Lee. The Combat Course is a unique experimental wear apparatus in which the test fabrics are subjected to rather well controlled, reproducible wear over nearly 20 distinctly different obstacles. Soldiers wearing the experimental and standard or control clothing pass over the course at a prescribed rate of speed, each obstacle must be traversed in a specified manner, so that all parts of the clothing are twisted, pulled, rubbed and strained during a complete circuit. Observers are stationed at strategic points to note whether the subjects are performing the slide down the cinder-covered embankment properly, whether they are squirming through the slit trench abdomenally, and whether the maze of cemented-in obstacles in the "ruined village" are being traversed as directed. Of particular value in the rating of a new clothing model or an experimental fabric is the quick observation at each station for the appearance of a hole or a rip, the loss of a button, or other evidences of deterioration. On successive days the soldiers wear different garments, and, if possible, each soldier wears each test item and control. By this procedure the variations of individual grace or awkwardness, violence of fall, methods of sliding, and similar individual habits are neutralized. It is most interesting to note that, whether trousers made of fabric A are worn out after 15 circuits of the course whereas B goes for 20 and C for 25, the location of the most severe wear and its progress from the first observed abrasion to a large hole or rip are remarkably similar in all three instances.

It is hoped that the Rain Course will produce controlled shower intensities of a uniform pattern. The selected types of obstacles are expected to give the effects of brushing through long, wet grass and heavy brush, climbing fences; traversing wet streets and woods, crawling through muddy ditches and the other cold, wet tasks our men are now facing in Europe. The value of many types of water repellent garments for the soldier may stand or fall as a result of this research tool.

The final step is the large scale field test or the observation of the performance of a product when used on maneuvers or in actual combat. Through the very nature of such a test, involving hundreds or even thousands of units of a new article of clothing, or new types of shoe soles, repair kits, or any of a host of articles, control cannot be as exact. Small scale field tests can be more accurately observed and have often provided specific information regarding the suitability of an item that led to more exhaustive investigation by test boards. For example, last winter in such a field test under the control of the Quartermaster Board a whole assembly of clothing was found to be unevenly and incorrectly sized. A more precise sizing study at Camp Lee disclosed the errors and corrective steps were taken for future procurement.

When the war is over, it is hoped that some of the results of these research and testing programs may be available to technologists concerned with evaluating consumer goods at every level of the textile industry.

The physiological laboratory data will give new knowledge as to which design

of garment, which fabric type or weave and which finish is the most comfortable and healthful and least burdensome in hot weather; what assembly should be worn during the winter; and what should be worn in vacation in a mosquito infested out-of-doors area.

RETAIL APPLICATIONS OF THIS NEW KNOWLEDGE

The controlled use kind of appraisal now being carried on by the test boards offer us, particularly the retail store laboratory technologists a hitherto little used tool. The chairman of this session, Mr. Dorn, has used it to a limited extent and all of us know of the study on slips conducted by Mr. Somaripa through the cooperation of one of the large mail order organizations. We cannot of course, duplicate the physical set-up of the Quartermaster Board nor afford the expense of so many experimental items, nor would we have the jurisdictional control over our guinea pigs. Nevertheless the technique is sound. Many of us will find ways to use those methods of appraising goods either through a cooperating school, orphanage, men's service club, woman's club or other group, the members of which will aid by giving a new article of clothing or other textile product a use-test of known history. The known history factor is very important and a momentary digression may be in order. In our program of evaluation of men's shirts we have used wear tests—field tests of a sort—in combination with laboratory data. The rear tail is cut off and from that sample we determine the original fabric characteristics. A new tail is sewed on and the measured shirt is worn by one of the members of our laboratory. All shirts are washed in a commercial laundry after each day's wear. Shrinkage measurements are recorded after each washing through 5, and then after every 5 washings until the shirt is judged to be nonserviceable. This point is reached when rips or tears appear and when a qualitative strength test shows the fabric to be greatly weakened. The laboratory evaluation of the fabric is then repeated in order to show the degree of strength change through the 25 to 50 wear-wash cycles. These shirts are given very similar wear, subject of course to laboratory accidents, nevertheless we have not been able to rate the collar wear of various brands of shirts. I always work with my collar open, and my collars very seldom wear out, two associates wear ties and keep their collars buttoned. One of these men gets 10 days less wear than does the other from the same brand shirt because the hair on his neck is so tough and stiff. A truly scientific field test would require me to wear a tie and would force the third man to have his neck shaved daily.

Frankly, we may hope for even more from some of these tests at the Quartermaster Board. Somehow or other very close, scientific appraisal of the progressive wear of fabrics on the Combat Course may eventually tell us what wear actually is and when a fabric begins to be so worn out that repairs are no longer economical. Perhaps such studies, continued even after the war, will aid all consumers, both the Armed Forces and the public, by providing technical laboratories with a device that has as good a life-span test accuracy as that Combat Course and that may be more scientifically controlled and interpreted.

OTHER BENEFITS FROM MILITARY EXPERIENCE

The amount and quality of Army clothing and supplies are dictated considerably by the requirement of transport. Lightness in weight and compactness are sometimes as important as adequacy for the intended use. In civilian use and, as a matter of fact, for a peace time Army, the rigors of climatic extremes are not generally encountered. For example, in extremely cold weather soldiers and civilians alike stay indoors much of the time. Marching, fighting, transporting supplies, building roads, bridges and railroads, flying at high altitudes, and other arduous war-time tasks are not often encountered. Similarly, our Armed Forces stationed in Panama and other hot areas do not move around much when the temperature is high. The fact that, when the war is over, the need for protecting vast numbers of men and women from perilous climatic extremes will no longer exist, does not minimize the importance of this new knowledge, these more protective fabrics, and the comfortable, easily transported garments. What has been of value in the Arctic will be of comparable value to us in more moderately cold areas in the United States and that which has eased the rigors of the jungle and desert will be of service to all of us during the summer months. As civilians we will be able to use more changes of clothing and carry more than Joe bore into combat, but on vacation trips lightness and transport will be as important to civilian Joe as they were when he was in uniform. Textile development, textile research and textile testing cannot overlook the lessons and new knowledge of these war years.

Other results we may anticipate from this period of durability-consciousness are as follows:

1. Increased regard for labels telling what the fabric is, what it will do, and how it should be cared for.

2. Rigid adherence to the F. T. C. rayon rules and other label regulations.

3. Standardized sizes, especially in children's clothing, but possibly also in many men's and women's apparel.

4. The control of new textile finishes making it necessary that the producer offer sound evidence of their safety before public sale.

5. Marked increase in the use of special finishes to add new life and character to textiles.

These programs will require the full cooperation of the textile technologists at every level of our industry. They should be evolved voluntarily with each of us working in his own segment, from the yarn producer clear down to the laboratory that appraises the finished consumer goods.

DISCUSSION

Chairman Dorn: This paper is now open for discussion, and I would like to call upon Ephraim Freedman.

Ephraim Freedman: I think this paper that Dr. Labarthe presented this morning is extremely interesting and exceptionally timely. This war certainly has taught us that there is a great deal that we have to learn about the things we thought we knew so well.

Considerable criticism has been raised regarding the efficacy of standard test procedures and other laboratory test procedures that have been developed during the past fifteen years or so. I think much of that criticism has been well founded. I think many of the tests do not go far enough toward telling or giving us the information we should have in order to evaluate textiles in terms of end use. However, I would like to point out at this time that a great deal of criticism also should be directed toward the use of test procedures without the person testing thinking clearly upon the subject of the test procedure itself and upon the adequacy of the apparatus to do the job under that particular test procedure.

I would like to cite a couple of examples. Mention was made before about water repellency. I happen to be the person responsible for the standards that were set up by the American Association of Textile Chemists and Colorists, the original standards which called for a hydrostatic pressure of 17 centimeters to differentiate between waterproof and showerproof fabrics.

At previous meetings during the past ten years I explained the difference in terminology as it was then employed. I won't go into that now, but we did find that the terminology was wrong in the

first place, that there was a difference between shower and shower; that is, a shower could be a downpour of water that resembled that which we had last night, and it might also mean a cloudburst. Naturally, the term "showerproof" was not adequate to cover the vast differences in rainfall.

We had occasion to listen to a man's complaint. He had purchased a coat that resisted a hydrostatic pressure of 32 centimeters, not 17, and I am certain that as far as the spray test was concerned it would have passed even the 70 or 80 per cent test. However, the man was in a cloudburst and became drenched.

Now, it wasn't the test that was ruined; it was the interruption of the test results. We are too prone to accept test procedures and apparatus and follow blindly and accept the results of the test in a manner disconcerting to us and definitely devastating to the ultimate consumer.

As far as service tests are concerned, I think we should have many more than in the past. But there again, don't let us be misled too much by service tests unless those service tests are conducted in a very thorough manner and over a wide range of—I use the term "possibilities." For example, if we were conducting weathering tests on fabrics we should run service tests in all sections of the universe, or all sections of the earth, so far as the Armed Forces are concerned. In other words, we ought to find out how fabrics would stand up in the Sahara Desert where the temperature might reach 150 or 160° F. in direct sunlight. We ought to run tests where the water fall is at a maximum, and I think that in some parts of India or thereabouts they have well over 200 inches of rain per year. I think in one section the recording has been made, if my memory serves me rightly, of close to 400 inches. We have temperatures of —90° F. in some sections of the world, and we have various other factors like the sand of the desert to cope with.

I think after the service tests have been run it would be smart to run a series of tests in the laboratory to simulate these conditions, and in that way we can obtain a much more intelligent view of not only our test procedure but the interpretation of the test results. I think that is very important. We know, for example, that for many years laboratories were reporting on the warmth of fabrics in terms of thermal conductivity, refusing to recognize, evidently, the fact that radiation and the disturbance of surface made a great difference in the worth of the fabric. Frankly, it seems to me that it took this war to bring out and show that many of the test results were inadequate, to say the least.

As to slippage, which was mentioned by Dr. Labarthe, we haven't encountered much difficulty with the slippage of fabrics. Perhaps that was because we were a little more careful about the fabrics we chose. I do know that people in the City of New York had quite a hard time with slippage of nylon fabrics in nylon blouses. The reason for that was simply that people were buying a lot of rejected nylon parachute cloth and making it into blouses, and they slipped badly. We refused to carry it and so had no difficulty there. Poor construction is definitely going to continue to play a great part in the slippage of fabrics, and better test procedures might well be set up.

Yesterday Mr. Dorn presented a very worthwhile report on the subject of washability tests, and criticism was levelled at the Launderometer. I think considerable improvement can be made in the test procedure, and I think all of us ought to support Mr. Dorn's committee to as great an extent as he asks us to in the conducting of tests to help solve this problem. It is a very serious problem. But there again, don't arrive at too hasty a conclusion with regard to serviceability tests. Study those tests very, very thoroughly and make sure that the results are conclusive before any new test procedures are evolved or enacted.

Jerome Nieman: With reference to Mr. Freedman's remarks on the origin of the so-called test methods, at what point and where do they arrive at the waterproof ratings?

Mr. Freedman: The original Suter hydrostatic pressure machine was geared up to a test up to 50 centimeters. We found that fabrics that would withstand a hydrostatic pressure of 50 centimeters for one hour would not be returned by customers.

I might add that at that time we also found the only fabrics that would withstand that were coated fabrics. So 50 centimeters was the minimum requirement for waterproof textiles.

Mr. Nieman: Just to follow through with reference to Mr. Freedman's remarks on the paper, and your remark on the fact that three men wearing the same shirt couldn't give the same test, the evaluations of all the tests are all right as long as they can come out of the laboratory into the field. We had a specific case where we took two identical coats, made the same way, same seams, and we stood on 23rd Street and Fifth Avenue in a rain storm and we sent two people out, one man to traverse the block from 23rd to 24th up to Sixth Avenue, and the other man to go in the opposite direction. One man came back good and wet and the other was dry.

We deducted from that that the human element, as far as moisture vapor transmission is concerned, is an important factor, too, and we have to take all those considerations into our testing methods, in order to come to a conclusion as to which method would be best to evaluate a so-called water repellent fabric; that is, the human element besides all the test methods we now have.

Dr. Labarthe: Fit is very important, also; it might not fit each man to the same extent.

Lt. Col. Frank Steadman: I am not sure whether this has been covered, but what size sample is normally necessary for adequate and significant determination of the characteristics such as wear or snag-resistance or any other such type of determination in the service testing? Of course, it would vary to the extent of the difference between the samples, but for a reasonable difference what size sample would you consider desirable?

Dr. Labarthe: A much larger sample than a department store laboratory ever gets. I would say a minimum of a yard.

Lt. Col. Steadman: What are the personnel requirements necessary to conduct a service test?

Dr. Labarthe: That depends upon the degree of observation. If you have about the same number of observers as test subjects you would probably get away with half a dozen. However, for the so-called moderately controlled test you should have an observer for each agent, I think, in order to get service test observation. Each subject over a period of time should wear each of the test articles and the control, whatever that may be.

Mr. Freedman: You mean the articles should be interchangeable, one article worn by each of the test subjects?

Dr. Labarthe: Either way. I think in general the best thing is to have the test last long enough so each subject can have his own article fitted to him in the proper size, and each one over a period of time can wear each of the test articles, however long the test may take. The difficulty with that is that it takes a long time to run a test on, let us say, the products of half a dozen manufacturers. The Army can afford to do it but a store can't. If we ran such a test the season would be well over before the test was completed. And frankly, when a test like that is run among civilians there is little control over them, and many fallacies creep into the reporting of the results

by the wearers of the garments; you must be very careful. It has to be essentially a subjective type of examination.

C. F. E. Sedgwick: I would like to ask this question in regard to the warmth testing of bed blankets: Should that be done in moving air or in still air?

Mr. Freedman: I would like to answer that a little more fully than the question would indicate. There are a number of things that should be remembered in the testing of blankets. In any given blanket you have temperature difference, air velocity, and humidity. All three are important in the evaluation of the warmth of a blanket. If you change the velocity the warmth will vary. If you change the humidity the warmth will vary. The amount of energy required to maintain a body enclosed by that blanket will remain pretty much the same in terms of watts per degree of Fahrenheit; that is, the different requirements for the segment of the temperature scale will remain the same. But the velocity and humidity must be controlled very carefully.

Mr. Sedgwick: What I am trying to get at is this: For a bed blanket on an ordinary bed, where would the wind velocity come in? Through an open window?

Mr. Freedman: If you open the window you have a rate of flow of air that will vary with the conditions outside the room.

Mr. Sedgwick: In other words, then, the blankets should be tested under a series of tests; it shouldn't be a standard test, for a blanket might be used in a room with a window open. How do you know what the public is going to do?

Mr. Freedman: That comes back to the service tests we were talking about. I think the blankets should be made capable of withstanding the severest conditions in a room. If they can be made that way the problem will be solved. That also holds for a lot of the test procedures.

Alfred Ashcroft: I think Mr. Sedgwick's question goes back to another problem in the setting up of the field test or the service test, and that is to assume there are certain conditions existing. When you set up the service test why not find out what the service conditions are? It shouldn't be impossible to measure wind and air velocity in enough rooms where people sleep to learn what the optimum is, and then set up the service test on the basis of that data.

Chairman Dorn: I would like to point out that there are pitfalls in service testing. You must make your tests to cover all conditions. I have an interesting experience I would like to call your attention to. This is not on textiles but leather. You are all familiar, probably, with the OPA and War Production Board's request for oil-treated shoe soles. My own company made a test on oil-treated shoe soles that was spread across the United States. Unfortunately the original test on these oil-treated soles performed by the government was more or less confined to Washington, D. C., and was limited to a group of high school students who wore the shoes to the parade grounds, and they got an increased percentage of wear. However, when the test was spread across the nation, in certain localities where there was smooth terrain there was increased wear. But out in the Rocky Mountain district, loose stones and rough terrain, those soles wore out much more rapidly than leather soles not oil-treated.

So you must have a wide picture of the problem in the service testing. You can't have a few isolated service tests under certain conditions.

Our next paper is entitled, "Laboratory Tests as Indices of Quality in Textiles," by A. Griffin Ashcroft.

Mr. Ashcroft! (Applause)

Mr. Ashcroft: The remarks of Dr. Labarthe and the persons who have commented on his paper illustrate, I am sure, the old axiom in regard to testing, as with other things, that the only person who knows more than anybody is everybody.

This subject is a very complex one. I think that all of us who speak to you here today and those of us who comment will attempt to simplify this problem much more than it deserves. It is more complex than even four speakers and a dozen commentators can cover in one session. I think if we begin to realize that, the remarks of Dr. La Barthe and the other speakers will be taken in their proper perspective with all of us.

. . . Thereupon Mr. Ashcroft presented his prepared paper . . .

THE INTERPRETATION OF LABORATORY TESTS AS QUALITY INDICES IN TEXTILES*

A. G. ASHCROFT

GROWTH OF LABORATORY TESTING

LABORATORY testing in the textile field has grown during the past decade to be a potent force in research, standardization and quality control. In other fields than textiles, a much longer history stands behind laboratory testing. In the field of structural engineering, for example, much data has been collected on the properties of a great variety of materials of construction. The public has not been burdened, however, with very much of this data for there is little of personal interest in such characteristics as the tensile strength of steel or the compression strength of concrete. In recent years, however, the public has been a sounding board for advertising promotion dealing with the test results of cigarettes for nicotine content, of the durability of mattresses, and the potency of insecticides and vitamin pills. The impression that *all* tests initiated by technicians, engineers and scientists may be applied without restrictions in the defining of quality, not only for research or quality control, but as a measure of the degree to which products would fill human wants, has been created and is, I am afraid, being nurtured by the failure of technicians to limit and restrict tests to the use for which they have been designed and developed.

We have learned that the translation of the art of textile manufacturing into a science of production requires the development of methods of measurement, the collection of data, and the translation of newly acquired knowledge into action. Many of us in the scientific fields have spent a good deal of time and effort convincing management and our colleagues in production and sales of the need for laboratories, equipment and personnel for the testing of raw materials and product. In this effort we have been part of a growing company. A report of the National Research Council[1] in 1940 includes, with other significant data, a survey of the startling growth of research and development laboratories in the United States during the past twenty

* Presented at Annual Meeting, Atlantic City, N. J., October 14, 1944.

years. Measured in terms of research personnel an increase from 10,000 in 1921 to over 70,000 in 1941 and a probable 100,000 in the postwar years, indicates a significant change in the internal organization of our industrial system. The value of groups of research chemists and engineers in the development of textile products and improvements in process is receiving increasing recognition, although many phases of the test methods which have made their research results possible are little understood.

THE TEXTILE INDUSTRY—POSTWAR

It is interesting to note that economists[2] are predicting a breakdown of the barriers between the various sciences and a great expansion of the research picture in the fabricating industries of which the textile industry is an obvious part. Research and development emphasis in these fabricating industries will be on the usefulness or utility of the material rather than upon the use of some available basic raw material such as cotton or wool of which the supply happens to be economic or accessible. The chemist, physicist and engineer will be working in the laboratories of the fabricating industries primarily in the interest of the consumer of his product, rather than for the owner or user of large stocks of traditional raw materials. The implications of this general statement may not be fuly appreciated without considerable discussion but it is a potential change in emphasis deserving the thoughtful consideration of textile technologists.

INCREASING DEMAND FOR TESTS

We should consider at this time how these changes in emphasis will affect laboratory testing and its relation to the consumer of our products. If we are developing goods with a growing emphasis on filling human desires, it would seem that pressure for tests as evidence of relative quality will increase and the influence of laboratory testing on the producer and consumer alike will grow like a mushroom. We can foresee a rising demand for new tests developed to measure length of service, maintenance of esthetic values, and a mixture of human desires extremely complicated in nature. The combining of the sciences, the rise of the fabricating industries and the expansion of research facilities and personnel each suggest an era of new problems in test development and interpretation. I am suggesting that we have felt, so far, only a breath of the problems in the interpretation and use of tests. Carelessness, inertia and an indiscriminate attitude about tests may make us partners in and not opponents of the growth of a whirlwind of perversion of testing into a form of scientific quackery.

A. Griffin Ashcroft, Director of Product Research, Alexander Smith & Sons Carpet Co., Yonkers, N. Y., has been an active representative of Alexander Smith & Sons Carpet Company in the technical societies of the textile industry for the past ten years. His experience in the textile industry dates from 1930 and has been entirely in the soft pile floor covering industry. He is a mechanical engineer, graduating from Cornell University in 1921, and a licensed professional engineer since 1934. He is an officer and member of committees of the A.S. T. M., T.R.I., I.R.I. and A.S.A. He has been active in the promotion of statistical methods applied to test methods and to quality control in manufacturing.

A CONSERVATIVE USE OF TESTS NEEDED

I may seem to be more concerned about this danger of the development of testing into a pseudo-science than has been indicated to some textile engineers by their own experience. We may lack experience of the growth of an evil and yet be part of it. The relative infancy of laboratory testing and its limited application to wide fields of quality in textiles may have a delayed impact on chemists and engineers in the textile fields. In fields where the engineering sciences were the originating source of product development laboratory testing has been an active force in product research but has not been emphasized in promoting utility values even though the testing was more directly related to service than are most textile tests. The testing of a motor, for example, has been standardized but these tests are not presumed to measure service life. Extensive use of service tests of automobiles in proving grounds aided in the improvement of the auto for better service but no claims or labels resulted. We can understand better, it seems, the distinction in the proper use of testing in products of a mechanical nature where performance value is a mechanical problem than we can where it is more personal as in blankets or dresses. Most types of tests developed for textiles up to this time are not closely related to human desire. The tensile strength of blankets is far removed from the real but complex reasons we purchase certain blankets, i.e. for lightness in weight, warmth, color, thickness, kind of fiber or cost. An excellent paper recently published by the Bureau of Standards indicates entirely different tests as criteria for human value. Their complexity may help to indicate their great value in research and development of blankets, even if they are difficult, if not impossible, to use in consumer promotion. It may be that as the textile industry develops its knowledge through improved tests it too will become *conservative* in the use of laboratory tests and will use testing to a greater degree in its legitimate spheres of influence—in research, in standardization and in control.

Perhaps that term "conservative" should be defined because I am implying that the present trend in the application of testing in the textile industry may be the antithesis of conservatism. George Cutten[3] defines a conservative as a person who has an open mind to the *proved values* of the past, and wishes to be reasonably sure of his course before he disrupts the conditions under which these values have developed and matured. Now, the conditions under which the valuable engineering test procedures have been developed in the past has been under the fire of the slow, careful forces of scientific, engineering criticism. The tests have been confined to their specific uses and not to advertising or to labeling or to promotion of value or to guaranteeing value to a consumer. They were not developed for that purpose and conservatively they were not launched on the strange uncharted course of a guarantee of fulfilling human desires by testing.

MISUSE OF LABORATORY TESTS

Some of the perversions of laboratory tests for strange uses are known to all. You are familiar with the promotion of value and the desire for cigarettes on the basis of nicotine content tests, length of burning tests and reduction of throat irritation tests. Promotion of germicides by tests, showing superiority of one disinfectant or germicide over another were current a few years ago. Fortunately for human health war-promoted-research on germicides has outstripped the advertisers and test comparisons. These are perhaps the extremes of perversion but the list of less vivid mis-uses of tests is long. Some of our thinking on labeling of textiles has a bit of this in its philosophy. It can be demonstrated that the identification, for example, of fiber content as required now by law has no relation in many instances to durability or other consumer values.

While your Research Committees are still improving and developing tests for sun-fastness and wash-fastness qualities in textiles the untried, uncorrelated tests are being promoted as standards for consumer value relationships. It is time that textile chemists restricted the use of their tests

to fields covered by their data. Before use in war service indicated that tests were inadequate, we had many erroneous ideas of the relation between laboratory tests and the actual values in the field of textiles treated for water, fire and weather resistance. Tests which we assumed measured utility of cloth for hot or cold climates have been made obsolete by war-stimulated service data. These are only a few examples in the textile field. Perhaps our war production experience has brought a touch of humility and in future promotions of new test methods for overall measures of human wants we will insist on the tempering, corrective data of actual use and the constructive criticism of the data of our associates; thus, we no longer will oversell laboratory tests or through inference or general language infer that they are designed as final measures of quality or wantableness.

TYPES OF QUALITY CRITERIA

There are good reasons for combining a new humility with our renewed effort in the development of tests for quality criteria. I recall Dr. Walter Shewhart's definition[4] several years ago of "quality" because it brought home the complicated nature of the broad values of which each of our tests was a small part. He said "a standard of quality which is satisfactory, adequate, dependable and economic from a long range viewpoint" might change "whenever the developments in the field of applied science make such changes desirable." Each of these terms defining quality includes the myriad variables of the wants of human beings and their way of living.

Certainly it is evident that we cannot *standardize* the satisfaction everyone obtains from the different values, dependabilities or economies of the products we buy, the houses we build, the cars we drive, the foods we eat or the amusements and sports we enjoy. We cannot and do not wish to limit the textiles we make to one type with known test wear-life dependability and thus disregard the value of economy to some, or of style satisfaction to others. This business of attempting to simplify wantableness in terms of a few of the quality characteristics that happen to be covered by laboratory tests is not science. It is not even good common sense. Let us, as engineers, be more wary of slogans and labels based upon a few indices of human wants and develop test methods which serve to an even greater degree to add to our knowledge of the properties of the materials we use and thus promote more quickly the development of new products which give wider satisfaction, adequacy for specific use, dependability in performance and an ever greater economy through greater human productivity.

Perhaps, if we classified the types of quality our tests were designed to measure, we would tend to better their design and to limit their applications. In general there are 3 types of quality[4] and a real need for tests for the evaluation of each type. "The first type is that which characterizes a thing independent of all other things and of human volition and interest." This type is illustrated by the measurements of basic chemical or physical values such as those for mass, velocity or density. Let us refer to this type as quality of Type I. In textiles, measurements of quality of this type and classifications based thereon have had limited publication. It was a pleasure to many to hear the Marburg Lecture this year by Dr. Harold DeWitt Smith and his study of textile fibers as engineering materials. His data on properties of textile fibers illustrate quality characteristics of this first type. Quality terms of this first type invariably include in their use a precise definition of the test method. The test results usually are independently verifiable data in a state of statistical control. Tests of this type are rarely misapplied. They are used as signposts for thinking and a sure guide toward new products.

Type II quality might be defined as "that which characterizes a thing A in its relation to another thing B and independent of human volition or interest." This type is the more common quality value measured, for example, by laboratory tests for weather resistance, for aging, for heat transmission or tests for many this type of quality are the basis of most other use relationships. Tests measuring applied research.

The third quality type may be defined as that which makes a thing desired by some group of people. Tests of Type II are frequently dressed up with a little bit of human desire and confused with Type III. Product having such attributes is, of course, the ultimate goal aimed at by every producer of goods for sale. It is not difficult to recognize that the thing which makes an automobile desired is the way it operates and performs and not the qualities of its parts as defined by Types I or II and the laboratory tests used to measure these qualities. In textiles however, this distinction is less obvious but we are misdirecting our efforts if we attempt to interpret quality of Type III, desirableness, in terms only of color fastness to light or to washing or of weight or count or strength. We are more certain to meet the very real demand for improved utility and serviceability and wantableness through research and development effort toward improved materials and design. We should suppress our desire to measure relative operational values with its myriad human and environmental variables by some simple test or comparison. We would save millions of dollars wasted each year if we could divert this effort to measure comparative ultimate consumer value in the direction of the development of improved real values. It is possible, if we did this, that some small part of the buying public might suffer in relative purchasing power because of errors in judgment but the consumer as a whole gains most through the knowledge obtained from continuous experiment stimulated by competition. Research and testing help to improve the qualities which make a product desired and thus increase its satisfaction, adequacy, dependability and economy for the consumer.

PROBLEMS OF INTERPRETATION

The problem of interpretation of tests is a very complicated matter. Interpretation depends, first, as has been indicated, upon the aim or goal of the test. Which type of quality was it designed to measure or to compare? Measures of quality of one type rarely, if ever, have easily interpreted meanings for another type. The test must be designed specifically for and limited in use to one type of quality characteristic.

If it is designed to measure quality criteria, independent of human interest, it cannot be *assumed* also to be an adequate measure of a degree of human desire. Interpretation is influenced also by the intent of use of the test. Laboratory tests are generally used to increase knowledge in three fields in manufacturing—Research and Development, Specification and Standardization, or Quality Control. They may be designed for research into the properties of a material or the effect of conditions of heat or cold or moisture upon the physical or chemical structure of materials or compounds. Because this field of application is generally basic science, we have been educated by our experience to insist upon evidences of precision and of accuracy before we accept the results of new or untried tests. A growing field of demand for tests is in *applied research* where comparisons of properties of products is of real value in guiding experimental judgment. An illustration of tests in this field would be the wear-test machine developed for carpet wear comparisons and in constant use by the carpet companies in aiding the development of new constructions, comparisons of production methods and choice of raw materials. Tests designed for

comparisons of quality of Type II for use in applied research require less precision than those for basic research or for measures of human interest. The Carpet Wear Test, for example, has a range of error in its present state of development of more than plus or minus 5 per cent. Repetitive tests and elimination of all variables but one in applied research testing make it valuable for this type of test use. However, its use for wear-value comparisons of grades of carpet of different manufacturers would have little meaning even if sufficient tests were made (estimated to be about 20 different series in many cases) and even with great improvement in the precision of the present test and equipment. Rarely have sufficient correlations with service been carried out with tests of this type which prove, by repetitive data, that comparisons of product A with B would mean to the consumer that the products would perform in a similar fashion in service. I recall an excellent study of service of dresses made from cloth, tested and rated in the laboratory, reported at a meeting of the Committee on Household and Garment Fabrics of Committee D-13, of the A.S.T.M. In this study the rating by laboratory test was confirmed by service data for about 60 per cent of the products. The conclusion was suggested that the variables of the service test were the cause of some poor correlation. It was evident also that the test itself was an inadequate indication of the relative human usefulness of these fabrics in actual service. We cannot claim that lack of correlation of service with testing is due to *lack of control of the variables in service*. Rather, we should conclude that tests designed only for quality comparisons independent of human desires cannot be properly used to grade fabrics for characteristics associated with complex human desires and uses. Test cannot be used to give numbers to one or two quality characteristics and the hidden values ignored.

NEW ATTITUDE TOWARD TESTS

The foregoing is an attempt to show the need for a new attitude toward laboratory tests. The attitude needed is one which will promote the development of test methods which are more precise, and also those properly designed and limited to its quality type. This new attitude would stimulate resistance to the misuse and perversion of tests in promotion, in advertising, in labeling or in bureaucratic control of manufacturing and would help develop a new approach to meeting the needs of the consumer.

The new attitude toward laboratory tests would be expressed in certain changes in pace and actions which might be called the scientific method. Some of the rules we should follow are:

1. Insist that any new test proposed for adoption be accompanied by data showing satisfactory measures of reproducibility, i.e. the precision of the test.

2. Insist that the test method includes the test data upon which its precision is based and that the scope or use of the test is limited to the scope of the data upon which it is based.

3. Insist that the limitations of the test are stated so that it cannot be misapplied through assumptions that it includes applications not covered by data.

4. Insist that the sampling technique be carefully outlined and that the number of tests for a given precision is presented.

5. Insist that data be presented showing satisfactory agreement in results (a state of statistical control) between tests made by skilled operators in several laboratories.

6. Insist that the original data is presented so that the evidence is available for all the predictions of the value of the test believed to eixst.

7. If the test is assumed to predict quality characteristics under service conditions insist that a correlation with service use be presented and not merely *assumed*.

8. Do not use tests of a single quality feature to prove human desirability or wantableness if the product is desired for many *different* quality features and, unless a test covers the hidden values, and not merely a single quality characteristic, its use in sales promotion is a perversion of textile laboratory testing.

DEVELO? A SCIENCE OF TEST METHOD PRESENTATION

One way to implement our new attitude toward laboratory tests is to follow an improved method of *test presentation* in our reporting on old and new test techniques. A standard form of presentation might go a long way toward limiting the test to its legitimate field of usefulness. Such a form of presentation might be developed from the outline which follows:

Using language which is definite and with all predicted applications based upon stated data which conveys knowledge supporting the conclusions:

1. Give the Purpose of the Test Method.

a. State its relationship to the quality characteristics it has been used to measure.

b. Refer to its major use as indicated by data, i.e. in Research, Development or Control of finished product.

c. Give its possible relationship to service values and if these relationships are unsupported by data, so state.

2. State to what materials or produtcs it has been applied and indicate that its use for other products should be supported by data before it is so used.

3. State its limitations where known.

4. Describe the test method in complete detail so that it would be unlikely that one would assume from the description that changes in the method or equipment could be made without effect on the precision of the test.

5. Describe the method of sampling and give data to indicate the precision of the test for a stated number of samples.

6. Include data supporting the conclusion that a skilled operator or laboratory will obtain values within a *stated* range of the average of the test results of a number of laboratories.

7. Avoid conclusions that the test is useful in indicating service performance unless correlating test data is shown.

CONCLUSION

The natural desire of technicians in the textile field to find answers to standardizing textiles for minimum quality values seems to have developed problems difficult to solve. In this paper an attempt has been made to show how our tests can be applied with less error in application and in the interpretation of the test results than has been evident. The major problem, however, of attempting to show how tests for Type 3 Quality can be developed and measures of human wants devised has not been answered. Dr. Walter Shewhart of the Bell Telephone Laboratories suggested that we try to find out what are the objective human wants in terms of the science developed to define them, Psychology. A starting point for action therefore might be the organization of a small group or committee consisting of a psychologist, a research engineer, a statistician and a chemist in the textile field. This group might indicate and classify human wants in Textiles. Such a classification of wants might direct our attention anew to the development of test methods measuring these wants and away from further use of count, weight or strength tests to indicate the wantableness of a textile. The Textile Industry should work toward this goal—increased public srevice through better classification of human wants.

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DISCUSSION

Chairman Dorn: This paper is now open for discussion. I would like to call on Dr. Miles Dahlen.

Dr. Miles A. Dahlen: It is perfectly hopeless for me to add anything to the paper. Instead of that I am going to try to put in a little plainer language the problem we are all faced with. First of all, we have to be honest. We have to do a technically correct job. We also have to deal with management, with sales organizations and with advertising people, and they are not a bit interested in our telling them what they can't do; they want us to tell them what they can do.

So I think we have to develop as much as we possibly can in learning their psychology and their language. We should take our tests and report them in our own technical way and develop them properly for our use as technical people. We also have to learn how to picture for them in very simple language a story they can use and understand.

My own experience is this: The advertising man and the salesman and so on don't understand many things that are technical, but they think they do. So the way to work with them is to let them think they do, to put words in their mouths and let them use them.

I think the very, very old saying fits there: If you can't beat the enemy join him. (Laughter)

Chairman Dorn: I would now like to call on Giles Hopkins.

Giles Hopkins: I have studied Mr. Ashcroft's paper with a great deal of interest. First of all, I want to state that I believe he has performed a real service to the textile industry in this excellent presentation of a problem with which most of us are constantly faced in various ramifications.

Loosely speaking, we have been experiencing a pendulum swing of interest. In the old days textile materials were sold largely on their emotional appeal, their color, their design, their style value, how they felt in the hand, and so forth. Although the discriminating buyer assumed certain serviceability characteristics which she hoped were proportional to the price paid, the reputation of the label, and similar earmarks, little discussion was given to the serviceability factors.

About ten to fifteen years ago we noted a beginning of interest in a more careful evaluation of the serviceability characteristics. The mills themselves, in attempting to obtain better control of their merchandise, and the awakened interest of the consumer, stimulated by various consumer organizations, contributed to this. The technical men most closely associated with this development sometimes become over-enthusiastic and every new method of evaluating a certain characteristic of a product was built up as a supposed benefit well out of proportion to its real value. Advertising agencies, seeking new terms and fresh approaches in attracting the consumer's attention to a particular product, grasped at this straw and still further inflated the public conception of the value of the results of tests as compared with opinions and emotions. The consumer interests, accelerated this inflation in their insistent demand for simple ways of comparing products.

As further study has been given to the application of test results, discrepancies between this over-simplified conception and the true picture became evident. First of all, we discovered that textiles are so variable that many samples and many specimens must be tested to obtain a true picture of a single characteristic of a product. The relationship between any one characteristic and the overall serviceability was usually found to be complicating by the relationship of many other, to date unmeasurable, characteristics of service. Furthermore, we became actively conscious that even if we are able to approximate the material values of an article, the buyer still included additional considerations before registering the actual balance of appeal. Regardless of how well a rug might wear, it would never be sold if it did not have style or was not appropriate to the general mood of the individual and the other possessions with which the individual was to surround himself. These unmeasurable factors have been termed by Mr. Ashcroft as the "human wants."

I can illustrate this situation by borrowing from the experience of the air conditioning people. The open fire place and the airtight stove had certain disadvantages. Primarily, they toasted one side of the body with radiant heat while chilling the other. But perhaps they had associated advantages. We have all experienced the extremely pleasant sensation of turning one's back to an open fire after one's shins are well toasted. Indeed, we have a class of people whom we term inveterate "fanny warmers," who always approach the open fire with a rear exposure in the preferred position. Sometimes I think that mantels were expressly designed to support the elbows or the back of the shoulders while "fanny warming."

Central heat, although much more scientific, and aimed primarily at control and uniformity, left us without certain satisfactions of the open fire, both visual and physical. The sense of hominess imparted by an open fire is one of the human wants to which Mr. Ashcroft refers. The ability to tilt back one's chair and place the feet in an elevated position near a pot-bellied stove is another of these essential "human wants."

We thought that we had reduced the central heating to its maximum effectiveness by adding temperature control, so as to heat the body to a completely uniform and standard temperature. But when this was accomplished we did not feel sensually more satisfied. We then decided that humidity control might fill the gap in our comfortableness. We then found that with both temperature and humidity completely standardized we had still fallen short of sublime comfort. We then concluded that we were happiest when we were continually either slightly cooling off or slightly warming up. In other words, controlled change was an important element of comfort.

In our textile testing we have focused our attention on standardization, on uniformity, on easily measured material characteristics. It is however, possible that change is desirable and that many of the characteristics that determine whether or not a product is wanted, must be measured by psychological techniques rather than tests contributed by the physicists.

How many of these characteristics can be measured, and how successfully they can be interpreted in terms of total expression of human wants remains to be seen. We certainly will never know until we investigate it.

I, therefore, heartily approve of Mr. Ashcroft's recommendation that this more intangible component of the relative desirability of a product should be given its share of study in our efforts to evaluate textile products.

Lt. Col. Steadman: May I make a comment on this suggested trend toward the increased number of test methods in evaluating any particular item? In the case of reporting the value of items for consumer use, that increased number of tests is going to bring almost a geometrical increase in the tests necessary for the evaluation of the overall desirability or efficiency of the item. Therefore, it would appear that for consumer test evaluation or for evaluating desirability, if we can arrive at composite tests for that comparison it will be much simpler of ultimate interpretation to the consumer.

We have heard in hearings before the Federal Trade Commission complaints

and comments and questions as to how we are going to put all of these characteristics which must be reported upon on a label on a spool of thread. Well, if we increase the number of tests which must be reported then we are going to be that much further from being able to report them so that the consumer can intelligently evaluate them.

So much for that. My other thought is perhaps a rhetorical question, as to how we can get this paper of Mr. Ashcroft's concretely before the Research Committee for its general and serious specific consideration. I think it merits the consideration of the Research Committee of this Association.

Chairman Dorn: I believe the chairman of the Executive Research Committee is here. Mr. Little, how can that be accomplished?

Leonard S. Little: I think that has been accomplished; it is being taken care of.

Chairman Dorn: Our next paper is the "Preparation of Specifications for Textile Materials," by Lt. Col. Frank M. Steadman of the Quarter Master Corps.

Colonel Steadman! (Applause)

. . . Thereupon Colonel Steadman presented his prepared paper. . . .

THE PREPARATION OF SPECIFICATIONS*

LT. COL. FRANK STEADMAN

SPECIFICATIONS are the foundation of all purchases of material of any type and of all transmission of production requirements. They vary in form from very simple requirements, such as "like your last delivery," to completely detailed descriptions and drawings such as might be required for the production of a battleship. In all cases involving purchase of other than goods visually inspected by the purchasor prior to consummation of purchase, such as the housewife's buying of vegetables at the corner grocery, the specification, in whatever form it may have been established, becomes immediately a part of the contract, a legal and binding agreement between the buyer and seller. As such, it is essential that it be no more susceptible of ambiguous interpretation than the remainder of the legal agreement. It must be susceptible of interpretation in court as are the delivery terms or the price basis. The more extensive the purchase, the more involved the procurement, the more important the compliance with the basic design requirements, the more important it becomes. This is particularly true, of course, of Governmental procurements, but the reasoning is no less applicable to commercial transactions of any type even though the laws and regulations are much less detailed and would become merely a case in equity in case of disagreement.

Fundamentally, specifications may be based upon two types of foundation, though parctically all other details of their preparation remain identical. One basis, much more restrictive than that with which the textile industry will normally be most concerned, is that in which the use to be made of the product very definitely defines not only the characteristics but, as well, the tolerances to be maintained. Such an example might be the diameter of a bullet which must pass through a steel rifle barrel of definite size in such a manner that the rifle shall fire as intended, or as a bearing must fit a shaft. Possibly some industrial fabrics approach this concept, but at the present time very few such rigid requirements are in force in any textile specification. The other type of foundation is that in which related characteristics are measured on samples representing good material and workmanship standards, and are then established as the basis. An example of such a type specification might be the weight and strength requirements for a fabric. The wearing qualities are somehow related, but there is no adequate test basis for measuring the wearing characteristics of, for instance, Cloth, Cotton, Herringbone Twill, so the measurable characteristics of good workmanship fabrics is taken as the specification basis. This latter type of specification is extremely difficult of logical change in the event of either manufacturing or raw material difficulties, or of unsatisfactory functional performance zecause the correlation between the quality characteristics measured and the functional characteristics is not known. Possibly strength might be reduced with a compensatory increase in weight, but how much? Only by long carefully controlled field tests could the effect be determined. Perhaps the answer would then be that the specification was already at the verge of providing functionally inadequate materials.

A specification of whichever type should follow a logical sequence. Where a number of specifications will be required within an organization, or within a trade or industry, ready understanding of all parties will be facilitated by all of these specifications being in substantially the same form and utilizing agreed upon terminology.

An outline of form for Federal Specifications has been issued by the Federal Specification Executive Committee for use as a guide in standardizing the form and phraseology of Federal Specifications. Inasmuch as that form is required to be followed in the preparation of U. S. Army and War Department Branch specifications, its form and sequence have become widely known. It is suggested that consideration be given to the use of that outlined form as a guide in any preparation of specifications which may be undertaken.[1] The first section of this form contains a list of references to all applicable specifications or standards; Section B to E inclusive, comprises the design specification; Section F comprises the acceptance specification; and the balance of the specification is given over to Packaging, Packing, Marking, Miscellaneous special requirements or items of general information. In actuality, the section on Packaging, Packing, and Marking comprises a design specification, and normally, by reference to other specifications, comprises the acceptance specification for the Packaging and Packing of the commodity. Needless to say this section is not applicable in test methods specifications.

This discussion is, however, primarily concerned with commodity specifications, with incidental discussion of test methods specifications as they relate to the acceptance testing of the product described. Commodity specifications must cover two principal topics in order to form the basis of an agreement concerning the production and delivery of any item. In the design sections of the specification there must be a description of the item and a definition of the quality which is to be delivered. The second portion of the specification defines the acceptance criteria by which a judgment is to be reached as to the conformance of the tendered materials to the requirements of the design stipulations of the specification. In all production, variation both as to design conformance and quality level inevitably occur. Both the design and the quality tolerances within which the production is deemed to be in conformance with the specification must be stated. Then the acceptance stipulations must establish

*Presented at Annual Meeting, Atlantic City, N. J., October 14, 1944.

the measures by which those tolerances are to be judged, both as to the quantity and the quality of the evidence required.

Test methods specifications partake essentially of the character of the acceptance specifications. They must establish in details within themselves or by reference, the method by which the test is to be conducted and the basis as to replication which must be provided to attain the degree of reliability of result for which the test is established.

In the design portion of the specification there must be, either in text, sketch, drawing or by reference to sample, a sufficiently complete description of the item so that there may be no possibility of misunderstanding as to what is to be delivered. It is not necessary that trade terms which are well established be defined in detail in such a description. For instance, the use of the term "plain weave" in describing the weave of a fabric is so well understood, so completely accepted by the textile industry that it would be unnecessary to describe in words or drawing the interlacing of the yarns making up such a weave. Similarly, it would be unnecessary to define the interlacing of the half-cardigan knitting stitch. It is appreciated that most weavers or converters of the textile industry would be unable to determine in detail whether or not a knitted item presented had been manufactured using the half-cardigan stitch; however, its formation is so completely standardized in the knitting trade that it is a sufficient stipulation of that portion of the design; no further description on that point is necessary. In other words, the design portion of the specification is written for the industry which will normally fabricate in compliance with the specification. The dependence upon such trade terms is valid, however, only to the extent that there is general and complete acceptance and understanding of their meaning. If the interpretation of that trade term can be so broad that in the case of litigation over the specification that the two litigants can each secure the services of "technical experts" who can testify in good faith that the interpretation by his client is in accordance with trade practice, then further definition of the term is essential. For instance, the mere description of a weave as an elastique would be inadequate since the weave formation may vary from a simple 8 harness twill to an intricately interlaced 24 harness twill weave.

Just as the acceptance of trade terminology may be utilized to avoid unnecessary length and details within the body of the written specification as to design and in some cases, possibly as to quality, so may the use by reference to auxiliary specifications and standards reduce the length and detail necessary in the basic specification as to all the characteristics of design, and acceptance determination. Reference may be made to Commercial Standards, Federal Specifications, U. S. Army Specifications, Quartermaster Corps and other branch specifications, A.S.T.M. Specifications and Methods, A.A.T.C.C. methods and any other of the multiplicity of standardized requirements and methods. To attempt to enumerate the possible sources of such, as American Leather Chemists' Association, T.A.P.P.I. and so on would be interminable. However, wide acquaintanceship and knowledge of the content and availability of such standards will be of value to anyone engaged in the preparation of specifications. In the utilization of such, care must be exercised that they are wholly applicable.

Lt. Col. Frank M. Steadman, QMC, U. S. A., Director of Research and Development, Philadelphia Quartermaster Depot, received his B.S. from the United States Military Academy in 1929 and his M.S. in textile engineering from Lowell Textile Institute. Colonel Steadman had approximately five years experience in Field Artillery and ten years in Quartermaster Service. Since 1939 he has been in his present assignment. He is now in charge of research, laboratory acceptance testing and the preparation of specifications for textiles and clothing.

The definition of quality is one of the most difficult portions of a specification to set down in writing or by any other means of record. It is not sufficient merely to say that it shall be "first quality" or "best workmanship" or any other of the all too common modes of specification stipulation of that type of characteristic. Again variability of production must be recognized and accepted. The segmentation of the levels of quality in such production is extremely difficult since normally the methods of measuring quality are totally inadequate or depend upon the individual skill and personal knowledge and judgment of the individual making such a determination. An example of this with which the textile industry is very familiar is the description of the hand of a fabric. Extensive investigations have been made into this matter and various and sundry methods of evaluating the characteristic have been proposed, the latest of which are the three machines (The Compression-Meter, Friction-Meter and the Planoflex)[2] developed by Dr. Edwin C. Dreby, Research Associate of the A.S.T.M. at the National Bureau of Standards.[3, 4] That work is a good example of the efforts of the textile industry to take heed of the philosophy of that eminent Scientist, Mathematician and Physicist, Lord Kelvin, who succinctly stated: "I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science, whatever the matter may be." Lord Kelvin's remarks apply with great force in any consideration of the preparation of specifications particularly for textiles. Specifications are intended to describe specifically the nature and quality of a material which is to be supplied on an order, whether it be within an organization as between one production division and another, or whether it be between a buyer and a seller in a commercial market. Particularly in the latter instance is the specification of prime importance since it becomes an integral part of the contract. In the not too distant past, specifications were little more than "like and equal to the standard sample." Someone at some time must put down in numbers the qualities which are being compared in order that any comparison may be made between the standard and the delivery. Upon that basis it appears obvious that the definition of all characteristics reduced to numerical values, insofar as it is possible, is a prime requisite in the preparation of specifications in order that the manner in which the conversion to numerical values will be agreed upon by both parties to the agreement.

As one considers the acceptance specifications, Lord Kelvin's philosophy becomes more obviously essential to the preparation of a specification. No two men see, feel, or think wholly alike. How then can it be hoped that agreement can always be reached on characteristics which are not susceptible of measurement? It is not impossible that the quality of the product would be judged as did the three blind men who felt of and described the elephant. Such possibilities are out of place in a situation where the evaluation must in some cases of disagreement, stand the impartial scrutiny of a court of law.

The acceptance section must state the quantity and nature of evidence which will be accepted as proof that the design

specification has been met. This evidence can only be predictive in nature, since only by complete inspection of every item of a lot presented, for all characteristics, whether the tests were destructive or not, could a certainty of compliance be obtained. However, the cost of such certainty is, in most cases, not economically justifiable, and in the case of destructive testing, impossible if any of the product is to be available for use.

It is with the acceptance section of textile specifications that the A.A.T.C.C. as an Association is most directly concerned, though its research activities directly benefit the standards of quality which are obtainable. Test methods must necessarily be simple, reproducible and of sufficient accuracy to discriminate between compliance and noncompliance with the specification requirements in regard to any characteristic which must be measured or determined. Test methods may vary from simple visual comparison with a standard sample through simple measurements of width of fabric on through intricate and involved spectrographic, photochemical or analytical methods. These methods must likewise be sufficiently standardized and widely accepted in order that there may be no argument as to their acceptability for the determination in the accuracy required.

Since the method and extent of sampling for the measurement of any characteristic affects the producer's risk of having lots of acceptable quality rejected and the purchaser's risk of accepting lots of less than specification quality, the sampling basis must be included either in the contract or in the specification. It is probable that the specification is the logical place for the promulgation of such sampling procedures since without its inclusion wide variations in stipulations as to sampling will undoubtedly occur, as a result of which no two contracts would actually stipulate the same quality of merchandise. If, of course, sampling standards are otherwise established than in the specification and are as rigidly adhered to, then it is not essential that they be included therein. However, the purchaser and the vender should both have knowledge of the effect of such sampling procedures and of the standard methods established. As manufacturers become more familiar with the methods of maintaining uniformity of quality in production and of evaluating the same, the import of this statement will become more evident.

Since hindsight is always better than foresight, the preparation of a design specification based upon predetermined standards of quality is always subject to less question than one promulgated without such a background of adequate knowledge. As Colonel Leslie E. Simon of the Ordnance Department has pointed out, three steps are required for the preparation of a specification. He lists them as "a determination of a standard of quality, a design specification, and finally, an inspection specification."[5] The first step is, of course, the determination of the characteristics of the item which must be described and for which a determination of the standard of quality is to be made. However, unless the item is entirely new, that step will undoubtedly have already been taken and expressed in some informal type of specification. Likewise consideration must be given to the acceptance tests and attributes which will be examined to determine compliance with quality. Then for each characteristic, either a measurable (or variables) characteristic or an attribute characteristic, a determination of the standard of quality must be made. This will usually be made using the acceptance test methods which will be specified. This determination will be based upon absolute performance requirements, as in the functional type of specification, or for the workmanship basis of a specification, upon the knowledge of what kind of a product can reasonably be expected under good manufacturing conditions. Upon the determination of the standard of quality for each characteristic, the design specification can be completed. The determination of quality will in addition, have provided necessary information for the sampling basis for the preparation of the acceptance section of the specification.

The determination of the standard of quality and its statement in the design specification have a scope and importance wider than is apparently generally realized. Careful examination and consideration of many specifications will bring one to the conclusion that only a very small portion of the products delivered against those specifications could ever have met the high level of quality apparently intended by the specification, since very often an impossible level of quality is stipulated. The alternative error is that the specification as regards quality is so vague that any quality offered could be interpreted as meeting the requirements of the specification. Such a requirement is obviously open to the vagaries of interpretation of various inspectors and is wholly undesirable in any attempt to maintain uniform standards. The preparation of an adequate inspection specification will very often focus attention on such vague and inadequate quality standards since, if the inspection specification is set up on a rational sampling and testing basis, the necessity for a concrete statement of quality will immediately become evident. An attempt to define the quality in numbers of defects allowable or of any other attribute will immediately necessitate the limits of such defectiveness being set. Without the establishment of such limits inspection would, of course, be unable to reach a judgment as to the probable conformance of the submitted lot to the specification requirements.

When the quality of the product can be measured and described numerically in units of measure, then it is much easier to state the design specification. Even in this case, however, care must be taken to insure that the basis set up is one which can be logically met by good manufacturing conditions. It is, of course, entirely possible to establish tolerances so close that even the best manufacturer could not hold his production within those tolerances. One source of common error in establishing such variables requirements in textiles is that the limits of variability are set from a totally inadequate sample. This is true whether the values established are based upon a minimum for individual or for average values or whether an average value is specified with plus and minus tolerance. If the basis, tensile strength for instance, is taken upon a number of measurements of strength within a single piece then the variation from piece to piece, which is normally more than within a piece, is not recognized and the specification may be either too low to require good workmanship or impossibly high for any but the best workmanship and finishing procedures.

The determination must be made early in the consideration of the basis of the specification as to whether the variables requirements are to be stated as averages, with tolerances, or whether they are to be minimums for either averages or for individual values. In general, most textile specifications promulgated by the Quartermaster Corps are based upon a minimum average value, five determinations being that commonly used in accordance with Federal Specification CCC-T-191a. Incidentally, that specification is silent upon one important question, that of sampling for the determination of such averages. Inasmuch as the lot is being sampled rather than each individual piece, it would appear logical to sample the variability of the lot by taking individual determinations from five pieces properly selected at random from the lot under consideration. The average of these five determinations would then be a reasonable measure of the quality of the lot for that particular characteristic. It may be desirable in some cases, where the fundamental characteristics of the item under consideration are close to the danger point,

to include a requirement in the specification that the individual values shall not fall below a specified minimum. In determining this minimum it is extremely important that the normal variability of the production be recognized and that such lower limit for individual values be set with full recognition of the distribution involved. For that resort will necessarily be had to a more extensive statistical analysis than can be covered in this discussion.

The determination of the standard of quality depends upon an intelligent and rational analysis of the data which is available from the testing of previous production of the item. It must be intelligent in the light of the engineering and economic factors which must be considered. If a portion of the product has been manufactured by a plant whose quality, both as to average level and as to control of uniformity is either much better, or is undesirably poor, then either engineering or economic, or both considerations may indicate the desirability of discarding the data from such production in determining the standards of quality to be established. It must be rational in the revealing light of statistical analysis. Statistical analysis means the examination of the sampling, and of the data as to its mathematical likelihood, and of obtaining from the data, measures of averages and of variability which must be expected from the conditions under which the item was manufactured.

For the statistical analysis of production preparatory to the establishment of standards of quality, the American War Standards "Guide for Quality Control and Control Chart Method of Analyzing Data" and "Control Chart Method of Controlling Quality During Production," published by the American Standards Association, provide an excellent tool in control charts, and the methods for their preparation and use in controlling production. This tool, augmented with a working knowledge of basic statistical methodology, which any high school graduate could grasp, will permit a ready and simple rational and reliable analysis of the data upon which it is proposed to establish the standards of quality. It will mark for rejection any data on production which was excessively variable, or was unreliable because of sharp and unexplained changes of quality.

It is obvious that some consideration of the design requirements to be included in the specification have necessarily guided the determination of the standard of quality, since the characteristics to be used to define the design are those which are susceptible of measurement or of comparison with a standard. It is not necessarily true that all characteristics which have been examined must be incorporated into the design specification. Some such characteristics will be found to bear reasonably linear relationships to others, so that the ones which may be measured the more reliably may be chosen as representing both. This is often desirable, not only to reduce inspection costs, but to simplify the evaluation of overall quality of a product being inspected. Obviously, if in a fabric specification the number of warp threads per inch and the width in inches were specified, it would be foolish to specify the total number of warp threads.

The characteristics specified may be considered under two general categories according to the methods of their measurement. They may be variables or attributes characteristics, which two types each require a typical method of expression of quality and limits of variability. Variables are those, as indicated by the term, that vary in measurable quantities, such as width, weight, thickness, strength, etc. Attributes are those characteristics which are evaluated simply as complying with the requirements or failing to comply, and are expressible only as the number or percent passing or failing. Variables may be treated as attributes, if the cost of inspection for their compliance as variables would be excessive as compared with the much more extensive sampling necessary to evaluate the quality of that characteristic on an attributes basis. The information obtainable on a variables basis is far more reliable and far more extensive for a given sample size than is that from an attribute evaluation. Therefore, quality characteristics should be measured if economically possible. For further information on this subject see Colonel Simon's "An Engineer's Manual of Statistical Methods" or other standard texts on statistical methods.

Having selected the characteristics to be considered as adequately describing the desired article and its quality level, the next problem is that of selecting the statistics which will be used to express the measure of that quality. The number of such simple but wholly reliable statistics is relatively few, though the inclusion of all would complicate the specification almost beyond possible overall evaluation as to acceptability of an item. Therefore, intelligent selection must be made from arithmetic means, average range, standard deviation, percent defective, defects per unit, and so on, though these represent the more useful statistics. Normally the arithmetic mean, the plain old familiar "average" is used for the variables measures, with, if not used as a minimum, normally a limit on variability stated in the same units of measure. The range, standard deviation and standard error will have been used in determining the minimum average, or the tolerances unless functional engineering requirements have otherwise fixed them. For attributes characteristics, either the percent defective, or the defects per unit (depending on the complexity of the item) will be the usual measure. It is in this type of design specification that refuge is so often taken in "Shall be first quality"—whatever that is!

Specifications need to be rewritten for one of two reasons; the design has been changed, or the specification does not fully satisfy those who must use it. When the design has changed, then if any extensive change has occurred which would require a reorganization of the process at some point, a redetermination of the standard of quality is essential. The variability of the finished product is affected by every stage of the process, so the variability of the revised product must be examined unless the normal level of quality is so far superior to the specification requirement that, as a matter of logic, the quality stipulation is unnecessary.

Changes of test methods must be studied as to their variability, and if any marked difference is indicated, it may be desirable to modify the design and acceptance specifications involved so as to secure the originally specified discrimination, or to allow the originally specified tolerances. To go to an impossible premise, suppose that a new breaking test method showed no variability, but indicated only the true variability of the fabric. Then producers operating with controlled quality as regards strength, could operate at a level closer to the specification minimum. The antithesis would be that a more variable test procedure would show an increased percentage of results below the normal limiting value, and in order to avoid facing a change of production level, a specification level set on such a lower limit would have to be established.

The preparation of a specification for a new item not previously produced is a task requiring much greater engineering judgment than is needed when the production can be checked as to its level and variability. Adequate sampling is seldom possible, even from one producer. Furthermore early production is often not of satisfactory uniformity, as a result of which wider variability tolerances determined therefrom may be so wide as to permit various other producers to operate at entirely different levels of quality. Furthermore, the reliability of the level at which the average should be set increases only with increased sampling from actual production. For further and more detailed treatment of such problems, reference is suggested to W. A. Shewhart's "Statistical Method" and his "Economical Control of

Quality of Manufactured Product." Attempts to guess tolerances may make the specification impossible of conformance, or may leave it foolishly wide open for careless manufacture resulting in non-uniformity of product, with a good chance that at least a small portion of it is unacceptably far from the desired standard of quality.

Incorrect or inadequate specifications can only cause difficulties and dissatisfaction on the part of the buyer or seller, or both, and may even break off trade relationships of long standing. Well drawn specifications define certain important characteristics of the product desired, and the better it is written, the more nearly will it bind the vendor to deliver what the purchaser wants, rather than only what he has specified.

In conclusion, specifications must be written clearly, concisely, and in a logical sequence of content. They must be so clearly written that they cannot be misinterpreted either as to the design or the acceptance stipulations. The design section must be logical, must describe a product in the quality which it can be manufactured in the quantity required. The acceptance specification must describe the means of determining compliance with the design specification and must establish the kind and quality of evidence which will be accepted as proof that the product being delivered is that which it was agreed to deliver. The design specification must describe a quality which has been established by the critical measure of statistical analytical methods and the acceptance specification must describe the measurements to be taken of each quality characteristic and must give the method of sampling the production and of evaluation of results. This again should be based upon statistical analytical methods which reduce common sense to terms of measured reliability.

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DISCUSSION

Chairman Dorn: The paper is now open for discussion. May we hear from Mr. Beckwith?

Mr. Beckwith: We are greatly indebted to Col. Steadman for his leadership in the study of the subject of the preparation of specifications. The army is our largest consumer of textile materials and the greatest user of specifications and inspection tests of textiles. It is fitting that they should lead the way towards improvement of specifications and it is a tribute to the progressive character of the Quartermaster Corps that they are doing so.

Col. Steadman's paper has shown us that it is not a simple job to write a good specification. However, I think some of us here may feel that the procedures outlined are bothersome complications of a problem which in itself will have little effect on our present or future textile activity. I believe this is a wrong attitude to take and I want to illustrate by a simple example how a poorly written specification can cause trouble.

After the war we may expect to find specifications for textile materials more widely used than before the war because of the growth of consumer testing. Especially will they be used by large buying organizations who have their own testing and inspection facilities. They will issue specifications for the materials they purchase. I think they will apply these specifications with a zealousness that even the army does not employ because after the war competition will be with us and if a buying organization concludes from its testing that one supplier gives better quality than another then they would probably confine their purchases to the group which they believe provides the better quality. It is important to the seller that the buyer does not draw incorrect conclusions about the quality of a seller's merchandise because of a poorly drawn specification.

I think many of you know of the specification by which fire, water, and weather resistant cotton duck is procured by the armed forces. To evaluate the flame proofness of a shipment of coated duck the specification states that flame tests on 5 specimens 2 ins. x 10 ins. shall be performed. If any test flames longer than two seconds then the duck does not conform to the specification, and, presumably the shipment is rejected.

Let us suppose that a 10,000 yd. lot or shipment of coated duck 36 ins. wide has been made. Then in this yardage there are about 648,000 possible pieces 2 ins. x 10 ins. Suppose we knew that 10 per cent of the lot was defective, that is 10 per cent of the 648,000 pieces flamed longer than 2 seconds. If this weer so then it can be shown that about 60 times out of 100 a sample of 5 would have been selected from the 10,000 yard shipment which would have shown 0 defects and 40 times out of 100 a sample would have been selected which showed more than 0 defects.

If the intent of the specification was to insure that duck was accepted, no portion of which flamed longer than 2 seconds, then it can be seen that this intent was not fulfilled.

Conversely, if the duck had a much lower percent defective than 10 per cent it can be shown that the probability of rejecting the duck would occur with a frequency that would be economically undesirable for the producer. Thus the specification does not insure that the buyer gets high quality and has exposed the seller to unnecessary rejections. With rational statistical analysis of acceptance data, as Col. Steadman points out, such a specification requirement would not have been written.

I would like to discuss this paper, point by point, but I am afraid we don't have time for that. I would like to bring out that we might differently subdivide the types of specifications than the two groups given by Col. Steadman. I would say that there are two main types of specifications:

1. Those which have to do with objective qualities such as the specification of density, volume, dimensions or tensile strength of a material.
2. Those which have to do with subjective qualities that are tied up with human wants.

The second group I would divide further into two kinds:

(a) Specifications which show uniformity of workmanship and material.

(b) Specifications which are directly related to value in use.

In the latter group we find the consumer type specification and consumer testing. With such a classification I think we will better understand and orient the many facets of the problem of specifications and testing.

I hope that some day a manual or procedure for the preparation of textile specifications will be developed which will cover simply and with illustrations this complex problem. Col. Steadman has made a good start towards this end.

Chairman Dorn: Our next subject will be presented by Earle M. Edgerton on "Consumer Protection in Informative Labeling." Mr. Edgerton!

Earle M. Edgerton: Before reading this paper I would like to say that there is no collusion between Mr. Ashcroft and myself. As a matter of fact, when I first prepared this paper and handed it in I wasn't too sure I would be allowed to give it. But I notice that Mr. Ashcroft has tread on the toes of the Association in somewhat the same manner I probably

will, so I feel a little less concerned about giving this paper.

. . . Thereupon Mr. Edgerton presented his prepared paper . . .

CONSUMER PROTECTION IN INFORMATIVE LABELING*

EARLE M. EDGERTON

Earle M. Edgerton, Director of the Technical Control Dept., Pacific Mills, New York, N. Y., was educated at Tufts College and Massachusetts Institute of Technology, majoring in chemistry. He has had textile plant printing and finishing experience in cotton, rayon and silk. The technical control department of Pacific Mills of which he is director consists of quality and cost control units, specifications, advertising, merchandising and manufacturing liaison and cordination.

ON February 18, 1938, it was my privilege to read a paper on "The Fastness Requirements of Printed Cottons" before a southern section of the American Association of Textile Colorists and Chemists. The opening sentence of that paper was as follows: "There is at the present time probably no phase of our industry in greater need of standardization than in the colorfastness of printed cotton fabrics, and in the interpretation and guarantee of this factor to the consumer."

Six and a half years later, I can again repeat that statement while at the same time admitting its inadequacy. The colorfastness of printed cotton fabrics is only a small part of the interpretation and guarantee of finished textiles to which the consumer is entitled.

On September 13, 1938, Dr. (now Lt. Col.) Kennedy of the Army Quartermaster Corps addressed the National Retail Dry Goods Association Convention on the subject: "A Solution to Customer Complaints Through Consumer Research." During the course of his address, he itemized three causes for consumer complaints:

1—Launching a product before it has been adequately tested in actual use;
2—Over-selling the customer on what a product can do;
3—Using flexible yard sticks of quality-standards that have variable and uncertain meanings.

Textile technology and new processing developments, as well as consumer education and organization have advanced tremendously since that time, but the same conditions face us today in even more important and dangerous forms.

Our country is engaged in a war, not only of men, planes, battleships, tanks and guns, but a war of supplies—food and clothing and other material.

Our industry produced over 12 billion square yards of textiles in 1942 and over 11 billion yards in 1943, in comparison with a normal 7 billion yards in peacetime years. To achieve and finish this production which included billions of yards of heavy goods for the armed forces not usually manufactured, it was necessary for the War Production Board to issue a number of directives on weaving and restrictions on materials for dyeing and finishing.

These directives besides insuring adequate military supplies, were also intended to produce the maximum amount of yardage for civilian and lend lease end use. In many cases the directives resulted in removing standard constructions from the civilian market and replacing them with substandard weaves of lower construction and weight to improve the overall yardage outturn. This factor plus restrictions on the use of some of the faster dyestuffs, coupled with the Office of Price Administration price control ceiling formulae, offered an opportunity for some unscrupulous operators to take advantage of the scarcity of goods and foist on the consumer fabric constructions of inadequate weight and durability for the intended end use, dyed with inferior colors, at a relatively exorbitant price.

Such a condition would have been impossible, or at least could not have endured, if true informative labeling were in existence.

On April 10, 1942, two and a half years ago, the Federal Trade Commission called a Hearing in New York for the purpose of "Directing the Proceedings, subject to the Commission's approval, of fair trade rules concerning the subject of colorfastness of textiles." At this Hearing innumerable briefs were presented by various interested parties, nearly all tacitly admitting the need for such rules, but varying widely in the proposed methods and nomenclatures.

During and after this meeting, some of the professional consumers combined with the consumer minded Standard Division of the Office of Price Administration in advocating the establishment of A-B-C-D Grade Labeling for Textiles.

Recognition of the necessity for informative labeling at this time was indicated in the introduction of the Federal Trade Commission's proposed trade practice rules as follows: "The need for such rules is accentuated by war time conditions, which is necessitating the conservation of critical dyestuffs, increased use of substitute dyes and changes in quality and service of goods, while at the same time enlarging the need for protection to industry, trade and the consuming public in respect to marketing practices affecting the many different textile products in which dyes or colors are used."

Following such a fair and comprehensive statement of considerations for fair trade practice rules, the Commission then proceeded to designate a set of rules which in the opinion of the majority of the manufacturing, converting and retail branches of the industry, were impractical and unworkable. In fact, so united was the protest of the industry that no further action in attempting to establish fair trade practice rules has been forthcoming to this date.

The effort of improperly informed professional consumer interests to force on the industry an impractical and unworkable set of fair trade practice rules for informative labeling at that time is regrettable. True informative labeling has received a set-back from which it may take some time to recover. Good business is predicated on honesty. No business long survives which does not sell honest merchandise, honestly represented, at a fair price.

No manufacturer who intends to stay in business will argue that the consumer, his ultimate customer, and the one who will eventually decide on the merits of his product, is not entitled to know what he or she is buying and what service can be expected of the product. Informative labeling, especially if it contains care and handling instructions, can increase the durability of the product and consequently the customer's satisfaction. On the other hand, no manufacturer can be expected to enthuse about a type of informative grade labeling, which degrades his product in comparison with some utopian standard far above the requirements of the particular field in which his product competes.

The need for informative labeling in the present market of war shortages and restricted sub-standard materials is acute. Some stores are hiding behind the war imposed substitutions and lack of guarantee by the seller, to refuse any guarantee

* Presented at Annual Meeting, Atlantic City, N. J., October 14, 1944.

to the consumer. This encourages further substitutions and downgrading and is just as inflationary as selling above a ceiling price. Unfortunately, there seems to be no recourse except for the stores to buy merchandise, which is labeled wherever possible, and to *leave the labels on.*

There are many new developments on the way for post war textiles, new cloths, new constructions, new colors and new finishes. Some of these developments will be so revolutionary that vast unexplored fields will be open to exploitation.

Many of you have experienced the thrill that results from the development of something new in the textile field. Most of you that have had that experience also know the let down that followed when over-enthusiastic claims and promotion or impractical application nullified the value of that development. The value of the new developments which are now completed, or in the process of completion, will depend to a great extent on sound promotion. This means careful testing of the new product for all of its qualities, both good and bad, determining the end use for which it is best fitted, and outlining in concise form a description of what it will do and how to care for it. Then consumer protection in informative labeling will not only protect the consumer, but will also protect the producer.

The basic fundamental of informative labeling is a description of facts. Description is usually relative. In almost every case, the characteristics of material being described must be compared in relation to some other thing of which the characteristics are generally known. You may say that a material is black, which is apparently a simple positive statement. Yet someone else may ask, "What kind of black?—jet black? blue black? dead black? or green black?" The difficulty of approaching the problem of description on a basis common to both the manufacturer and the consumer is acute, yet without that common ground, the problem of informative labeling cannot be adequately solved. The hackneyed descriptive terms to designate colorfastness in use for years have no longer any general significance and have lost their effectiveness. Yet, if the industry as a whole would agree not to use these terms, unless the material passed certain specific adequate tests, these terms could have a definite meaning. The professional consumer, however, does not want these terms and can suggest nothing better than a Grade A B C D which, at best, would damn with faint praise.

The problem of adequately identifying relative colorfastness is small indeed in relation to the problem of describing the new developments which will appear in post war operations. Here again, the consumer must not only be educated in new qualities of textiles which never before have existed but, most important of all, he must be educated in the limitations of these new developments so that they are not improperly used or exploited.

New developments in chemically modified finishes will find the field of testing methods woefully inadequate to express the relative advantages of the new products, not only in the lack of testing methods for the new features, but in the explanation of the relatively increased values of existing characteristics. For example, suppose a new finish very materially increased the wearing qualities of a fabric without, however, increasing its tensile strength, and at the same time rendered the fabric capable of killing bacteria. Either of these qualities alone would be desirable, but a combination of both would be a decided asset in the wearing apparel trade. How would this fabric be tested and how labeled? To determine the increased wearing qualities, on which of the six different abrasion machines would the fabric be tested, and how would the increase in cycles be explained on an informative label, and how would the bactericidal qualities be explained? It is obvious that new developments will require new testing methods, but they will also require interpretations so that they can be explained to the consumer.

Part of the failure of informative labeling to date on the subject of colorfastness to washing, light and perspiration, waterproofing and weathering, and the durability of fabrics to wear and abrasion, lies in the inadequacy of present testing methods and apparatus, or in the lack of correlation of such testing methods with actual field service. No test method fulfills its obligation unless it discloses a procedure which is repeatable in different laboratories with different operators, and also forecasts the performance of the tested material in actual use, backed up by adequate field trials. Such a study is now under way in relation to one phase of colorfastness. Much time has been put in on the study of other testing methods, but the work is as yet uncorrelated.

No one questions the fact that the consumer is entitled to protection by informative labeling. Any reputable manufacturer, finisher, converter, garment manufacturer or retail store would be glad to furnish or pass along the necessary information if it were based on adequate tests and could be explained in the language of performance.

The American Association of Textile Colorists and Chemists has long been the leader in the field of the development of textile testing methods. Your personnel, with its broad representation in the dyeing and finishing industry, is admirably adapted to the task. The policy of the Association has been to restrict itself to the development of testing methods without regard to the interpretation of the results of those testing methods.

By the interpretation of results of testing methods, I do not mean the establishment of descriptive terms or terminology to be used in labeling, but an explanation of the performance which can be expected of materials which pass the various tests, such as is contained in CS-59-44.

Your members are daily delivering to the channels of trade processed fabrics tested according to your test methods, and are not only taking the responsibility for the satisfactory performance of these materials, but are the ones called to task when complaints or claims arise.

I have tried to show that informative labeling depends not only on the desire to label, but also on adequate test methods combined with a description of the performance which can be expected from materials which pass the various tests. The past policy of your Association in refraining from any such description leaves the job only half done. Such description, admittedly, would and should entail extensive field trials, but if the job is worth doing in the first place, it should be worth completing. Industry and consumers have tried to write descriptive terms which could be used in informative labeling, but could not agree on the performance which could be expected as a result of testing methods and, therefore, could not agree on descriptive terminology.

Who else is better qualified to interpret the results which may be expected in actual service from fabrics which pass the various tests developed by your Association than your own members?

The future of informative labeling lies largely in your hands.

DISCUSSION

Chairman Dorn: The paper is now open for discussion, and I am going to call on Dr. Coughlin.

Dr. Coughlin: Mr. Edgerton, it is evidently your idea that the AATCC should set up the terminology for the performance of their tests.

Mr. Edgerton: There is a great deal of difference betwen terminology and labeling or description. No one is asking the Association to step out of its field of testing methods and try to develop terminology for use in labeling.

What I am asking is that the Association complete the job which

they started when they established testing methods and write in a description of the performance which can be expected from fabrics which pass any given test. In other words, for fabrics which pass the Number 3 Test in your own Year Book, you say—such fabrics are supposed to have Class 3 colorfastness to washing, period. What does that mean? You have left the job of the meaning of that test to someone else who has not the technical background in developing the test which your own Association has.

CS 59-44 states at the end of each test: "Fabrics which pass this test can be expected to . . ." and then a description of the conditions under which the fabric is tested, and it explains that such fabrics should perform in service in some definite manner. Now, if that performance isn't correct the test is no good.

Does that answer your question?

Mr. Little: I think that point was well taken. I don't think, perhaps, he is quite fully informed on what the policy of the Association is. In your own Washfastness Committee the purpose of your testing, as I understand it, is, first, to find out what happens to fabrics in a very wide range of washing tests, both in the laundry and home washing, and elsewhere. It was my understanding that when you did those tests your job was to take swatches and evaluate them, and next try to determine what was the average experience in 5, 10, 20 or 30 washings. Then it was the purpose of your committee to establish a method probably new, of laboratory testing which would give an accelerated test comparable with 5, 10, 20 or 30 washes.

I see no reason why the Association should not clearly state after that job was done that such a fabric, according to the test approved by the Association, will stand a definite number of washings. I think that is quite concrete. Also, in the Executive Research Committee it is definitely approved and established that when test methods have been approved we will get togther with industry. We haven't set up a formula for it yet, but the idea is that we will call in the finishers, the converters, the testing laboratories, and some representative for the consumer, and, even before the test has been approved, fully inform those groups and get their criticisms and make changes if necessary. After that is done we will present the test method to an equally representative group for them to discuss it with us so they can develop terminology in terms of consumer use in relation to the standard test.

So I think the mechanism is clearly in mind. It may not be in operation now because we merely are starting the new research program, but I think the suggestion is well taken, and we have it definitely in mind.

Dr. Coughlin: I can easily see Mr. Edgerton's paper requires no great stimulant to get people to talk about it. It evidently has been somewhat of a sensation for a man to get up and say how the methods of testing and the reporting of the results of testing have been inadequate over a long period of years.

However, I am sure the question has been in the mind of other people as well as Mr. Edgerton. In fact, I feel almost sure Mr. Ashcroft felt the same inadequacy as far as reporting was concerned, because in his eight rules for guiding the useability of a given test he included the correct interpretation of the performance data as an essential. The suggestion that Mr. Edgerton has made that there be a correlation between the results of the test and the performance and use are incorporated in the suggestion of Mr. Ashcroft. I think that if Mr. Edgerton's suggestions are interpreted in the light of Mr. Ashcroft's, we have the means of carrying out the suggestions which Mr. Edgerton has made.

In connection with his paper some incidental points came to mind, namely, the fact that data are reported incorrectly in many instances today. All that one needs to do is to read current advertisements and find the wide divergence of opinions concerning the results of tests; therefore, I think in any given organization there should be a closer tie-up between the technicians, such as you represent here, and the advertising people. If there were a better tie-up then facts would be described more correctly than they have been in the past.

In the light of what Mr. Ashcroft said this morning it is very evident also that many of the present tests today are not capable of being expressed in terms of performance, and therefore Mr. Edgerton's suggestion, to my mind, seems to be that in the future we design certain tests specifically to be able to predict performance entirely and forget whether or not they are useful as comparative tests. On the same subject I would like to ask a question of Mr. Edgerton: Could you go over the present test methods that are inadequate at the present time and pick out any that are capable now of proper interpretation, or would it require a whole lot of new work to find out this correlation? Is it possible to take the existing tests and identify those not capable of proper interpretation?

Mr. Edgerton: I make no attempt at being able to diagnose the case from that standpoint. However, the point that I was trying to put over was that in one case the Association was attempting to correlate testing methods with performance in connection with the washfastness program now under way. Instead of starting out and establishing a number of testing methods and then trying to fit the testing methods into an end use, the subject should be studied from the other way,—the way it is being done now in the question of washfastness wherein samples are actually field tested. They are subjected to a number of launderings and then the adequacy tests is determined on the results of the field service.

I think that same procedure would have to be followed in almost all of the existing test methods, because in some cases there is no correlation, not only between the testing methods and predicted performance, but due to lack of proper equipment, if you will, there are a number of methods not repeatable by different people in different laboratories or even sometimes by the same people in the same laboratory.

The point I have been trying to bring up is not a criticism of the Association; I have been trying to point out the need for an adequate tie-in between testing methods and prediction of performance and then informative labels.

Mr. Ashcroft: I would like to comment particularly on Dr. Coughlin's questions and Mr. Edgerton's explanations. I wonder if the essence of these comments isn't the approach of the test methods to human wantableness being a complete change from the present practice to a new approach where we evaluate what we want first and set up the test methods afterwards. Just as an illustration of the growing unanimity here—it is quite evident, and apparently coming into the field somewhat less directly—there is an article which just came to my desk Thursday, by William B. Floyd, formerly head of Sears Roebuck advertising, in the American Standards Association's "Industrial Standardization." It is worth reading. I won't read it all, but there are a couple of comments here that are very interesting.

He says that the merchandising considerations are being introduced into testing and that the standards committees—meaning this group, too—have had to recognize that they exist.

In the final paragraph he says, "The fact that some differences in requirements may have a partly psychological basis does not make them less real or less tangible. The psychological preferences involved are very objectively reflected in

sales figures. They can also be readily subjected to objective tests by presenting various designs in the same display and recording customer choices." Some of the people in the customer research groups won't agree. The choice there is what you know you can have and not what you could have. The last sentence says, "The real problem, as with all specifications or standards, is that of determining just what functional characteristics are important to each class of user, and just what tests or inspections can be devised to measure these characteristics."

Chairman Dorn: Mr. Young, have you any remarks to make concerning the paper?

Edward N. Young: I think my questions have been answered. However, I might ask one thing. I notice the ball being passed along here. We have a description of the tests now, but there is a gap when we come to the informative label. Who supplies the wording of the label, in your opinion? The seller or some organization?

Mr. Edgerton: Of course, that question has to be answered in a matter of opinion. We have reason to believe that after the war is over there will be a very decided return to agitation for fair trade practice rules. If, in the meantime, the industry were able to have coordinated tests which could be proven as to their value in service, I think a great deal of the difficulty in arriving at proper descriptive terms would be eliminated. At the present time there are so many people who want to put so many descriptions of the performance of testing methods on the labels that no one can arrive at the same terminology.

Member: I would like to point out here that this question of terminology and what it amounts to is not the work of any one particular group itself; it is the work of all groups involved. I think it means the meeting of the minds of an industry standard. We should have started out long ago on field testing instead of wasting so much time on the results of laboratory testing. We have worked backwards. But I think all groups involved will have to get together and decide on the standard type of terminology all should agree to use. I think it would simplify it a great deal.

It comes right down to industry standards. Our group has been working with all groups. That is the best way to solve it.

Dr. Coughlin: Assuming that these test results will be correlated so they can be stated in accurate terms, so they are of use to the consumer, the problem Mr. Young brought up is very interesting. Today we have the fabric manufacturer, the converter and the customer. A fabric manufacturer will produce a piece of taffeta and it is dyed up in a given shade, and it is liable to be used for a drapery fabric, a slipcover, or a bathing suit. The ultimate producer of the finished article doesn't know which of the many properties he should have been looking for when he bought that material. There has to be, as Mr. Young brought out, some means whereby the final buyer can get the proper informative information on the label.

Mr. Edgerton knows how that works today, or how it fails to work. Have you any suggestion on how the ultimate producer of the finished article can get the information that will be available?

Mr. Edgerton: The only way I can answer that question is, again, by personal opinion. It seems to me that we are trying to accomplish an end result with a beginning and no middle. In other words, I feel that if our testing methods were correlated with field service so that performance could be predicted, then the problem of arriving at the proper descriptive terminology and the requirements for the proper end use could be much more easily and soundly arrived at.

Mr. Little: To make it clear, the Washfastness Committee is not the only committee pursuing the end use idea. That is the whole policy of the new Research Committee. To illustrate another study: we want to get actual rain experience and then correlate our testing methods so we can say a fabric will withstand a light, ordinary or heavy rain either single or double. We have this study underway. This is the prime focus of the program of the new Research Committee.

I would like to have some discussion or suggestions for the benefit of our commitee as to whether our thinking is sound that we invite representatives of the various groups—and we have those representatives in many cases in our own membership—to form an industry committee within A.A.T.C.C. to work out proper evaluation, terminology, and the like. Or would it be sounder for A.A.T.C.C. to stick to developing standard test methods, give our interpretations, and then request the Bureau of Standards to call a meeting of the group, each association electing their own representative.

Mr. Ashcroft: I think that question is one we ought to take away with us and seriously consider, so that all of our suggestions can be put into a pot and mixed together. If we think of the development of test methods as a series of actions based on a desire and need on our part, we probably would automatically endorse the development of small groups in a society like this to have a specific test method for a specific purpose.

However, I think it has been the habit of the societies doing that to depend too much on their own knowledge and experience and not carry out the intermediate step which Mr. Edgerton mentioned. They do not carry that forward to the interplay of the other societies not immediately interested in the development work of the original test.

Secondly, I think we ought to get into the picture at an early point the other sciences that are involved in the merchandising and psychological demand picture. We assume we have enough knowledge for this picture and we really don't.

Our current illustration in the carpet industry, for example, is the use of another type of yarn in place of jute. Kraft cords has been used now for two years, and no one had any real knowledge of the utility value of that material. They approached it somewhat on this basis: They knew what the end result value ought to be in terms of service. Could they find anything in test methods which would evaluate that end use? They found that a very difficult thing to do. They could measure the strength wet and dry; they could measure the abrasive wear on a wear test machine; they could measure a washing test. However, they couldn't tell from all the tests what the service picture would be.

Here is another thought: Maybe it is necessary to have a guinea-pig picture to really get the answer, and if it is on a small enough scale it won't be too bad a method of evaluating. Some of the initial tests will work out in the end. If it isn't promoted as an untrue representation, it certainly will result in the acquisition of knowledge and value.

I think all those things have to be thought out by us and put into a melting pot, and perhaps we will get a procedure more valuable than the one in the past. It is significant that we are thinking about those things now.

Mr. Little: I would appreciate any correspondence or discussion with anyone here on this subject, to bring this thing to a head and help direct the thinking of the committee.

—◆ ◆—

CORRECTION

Re: Piedmont Section Meeting

THE name of the banquet speaker for the November 3rd meeting of the Piedmont Section was misspelled in our October 9th and 23rd issues. It should have read: R. W. Arrington, President of Union Bleachery, Greenville, S. C.

MEETINGS RHODE ISLAND SECTION

THE first meeting of the Rhode Island Section for this season was held on September 29th in the Hall of the Providence Engineering Society, as usual. The topic of the evening was "Aralac—Its Properties and Processing." The paper was prepared by G. Duncan Carmichael, Director of Chemical Research and Development, Aralac, Inc. and was presented by Clifford A. Nangle. The discussion afterward brought forth many interesting questions which were answered by Mr. Carmichael. The meeting adjourned about 10 P.M.

The attendance was 80.

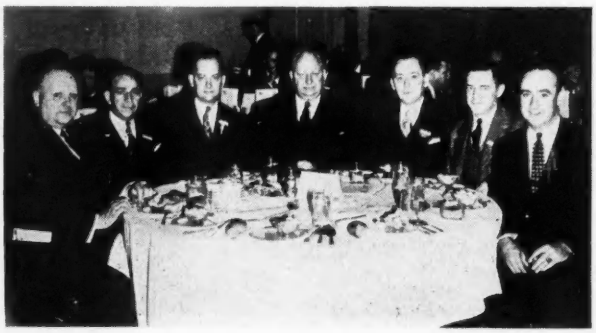
The second meeting of the Rhode Island Section was held on October 27th, and a full program was presented. First, R. W. Jacoby read the paper which won first prize in the Intersectional Contest held in Atlantic City. This was "Factors Affecting Color Yield in Vat Color Printing" and it was illustrated with photographs, prints, charts, graphs and slides. This array of data explained and summarized the large amount of work with thickeners used in vat printing. The experiments and conclusions were the result of the cooperative effort of a dozen Rhode Island members headed by Mr. Jacoby, who announced that the prize money would be distributed among the several members who did the most work. The committee, through Allison R. Fletcher, presented Mr. Jacoby with an alligator skin note-book. Mr. Jacoby expressed his sincere thanks, not only for the gift, but for the fine cooperation of the committee without whose efforts the work would not have been achieved.

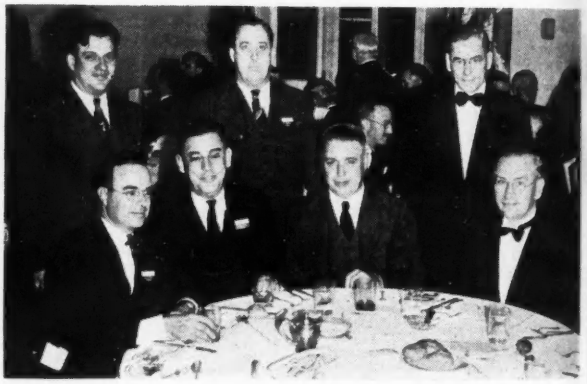
"The Shrinkage Control of Wool" was the second paper, presented by Alden D. Nute, technical representative in textiles, Calco Chemical Division, American Cyanamid Co. After reviewing other methods tried, suggested or abandoned in the past, the speaker described in detail the application of results of a new type of "shrinkable control" of wool which uses a melamine type of resin, patented and trademarked by his company as Lanaset. The talk was illustrated with photographs, charts, and tables, and also by actual examples of fabrics and clothing before and after treatment. A question and answer period followed.

The attendance was 100 and the meeting, held as usual in the Providence Engineering Society Hall, adjourned at 10:15 P.M.

Respectfully submitted,
Robert E. Joerger, *Secretary.*

AMONG THOSE PRESENT AT ANNUAL BANQUET, ATLANTIC CITY, OCTOBER 14





Photos by John E. Trezise

CALENDAR OF COMING EVENTS

Meeting, New York Section, Downtown Athletic Club, 19 West St., New York City, January 12, 1945.

Meeting, Philadelphia Section, January 12, 1945.

Meeting, Northern New England Section. January 26, 1945.

Meeting, Rhode Island Section, Providence Engineering Society Hall, 195 Angell Street, Providence, R. I., November 24, 1944. Speaker: Lt. Col. John H. Talbot, Medical Corps, U. S. A., Commanding Officer and Director of Research, Climatic Research Laboratory, Lawrence, Mass.: "Clothing and Equipment for the Combat Soldier."

Meeting, Southeastern Section, Atlanta Athletic Club, Atlanta, Ga., November 25, 1944. Speaker: Dr. Donald H. Powers, Monsanto Chemical Co., "What We May Expect from Resins for Textile Applications." Election of officers will take place.

Meeting, South Central Section, Patten Hotel, Chattanooga, Tenn., December 9th, 1944. Speaker: John R. Berwick, Sandoz Chemical Works, Inc., "Metachrome Dyeing of Wool."

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NOTICE REGARDING ANNUAL MEETING REPORTS

Beginning with last issue, reports of meetings and papers presented at the Annual Meeting, will be published as rapidly as possible. Because of limits on the amount of paper we may use we will be limited in the number of papers or reports that may appear in each issue. We will, however, exclude other articles until such time as all reports and papers of the Annual Meeting have been published.

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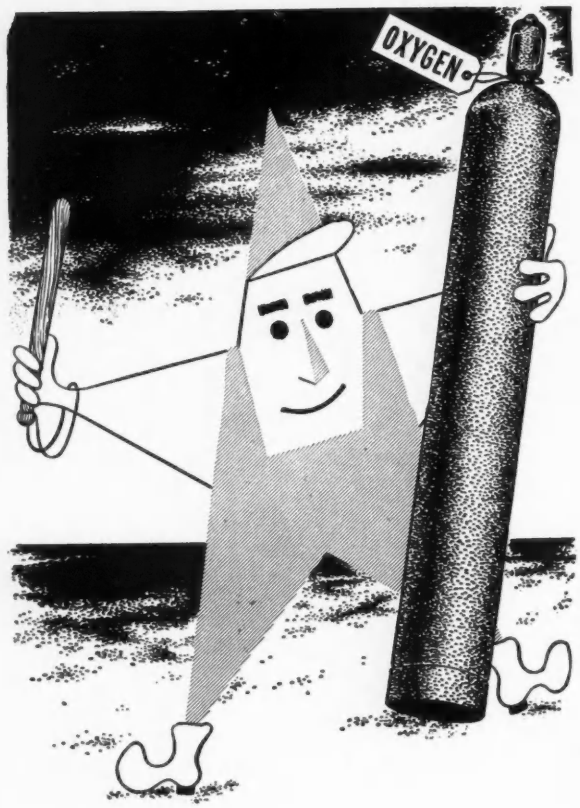

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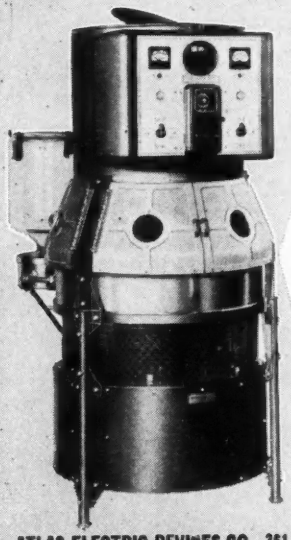

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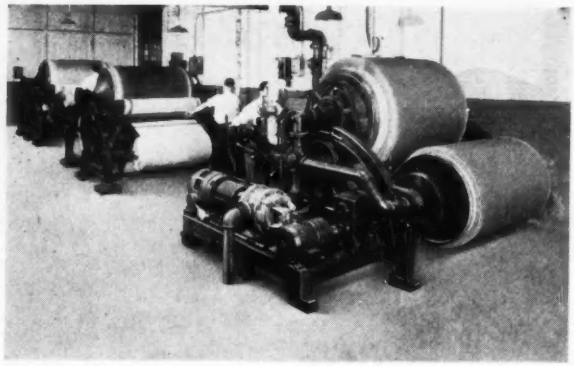

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leave your wools and worsteds clean, soft and properly finished

Laurel Oils and Soaps lubricate, scour and full your wool and worsteds quickly, thoroughly, safely—and without increasing production costs. They come through clean, soft and properly fulled.

Known for over thirty-five years for their uniform quality and safe, efficient action, Laurel Wool Oils and Soaps are standard processing agents for hundreds of wool and worsted mills. Among the favorites are—

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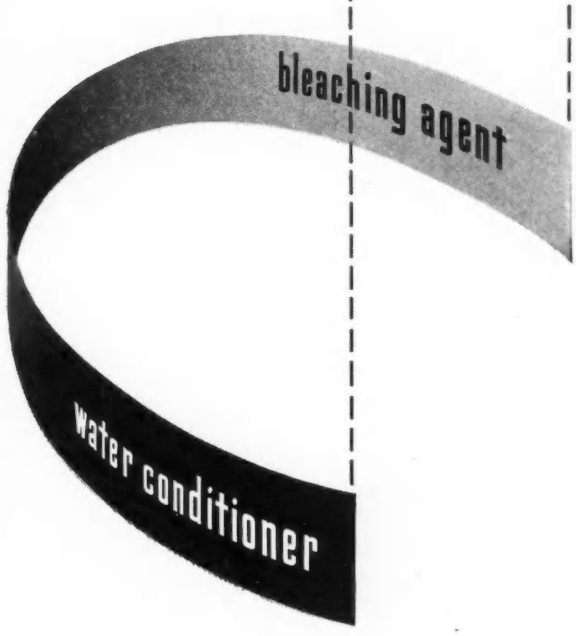

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This bleaching agent and water conditioner is effective, versatile, and economical. SOLVAY Liquid Chlorine has long been recognized for its controlled quality, highest standards of purity, and dependable uniformity—your assurance of satisfaction and performance.

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The said Mr. Ramdeo A. Podar and others are no more interested in the said company and its affairs, and Mr. V. K. Menon is now the Managing Director of the said company.

V. K. MENON, *Managing Director*

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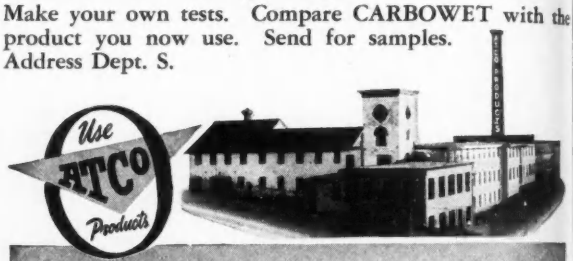

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- Level Dyeing
- Excellent light fastness

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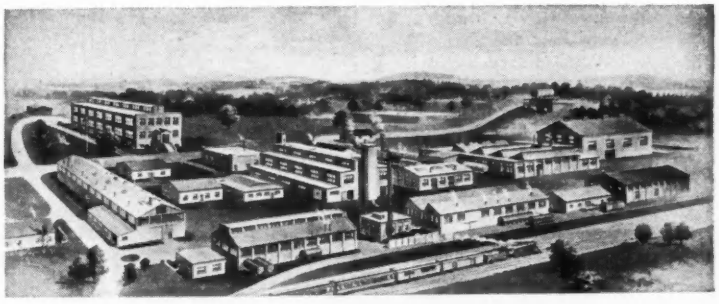

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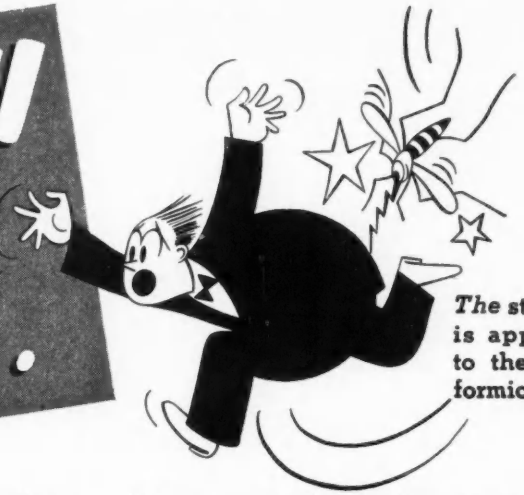

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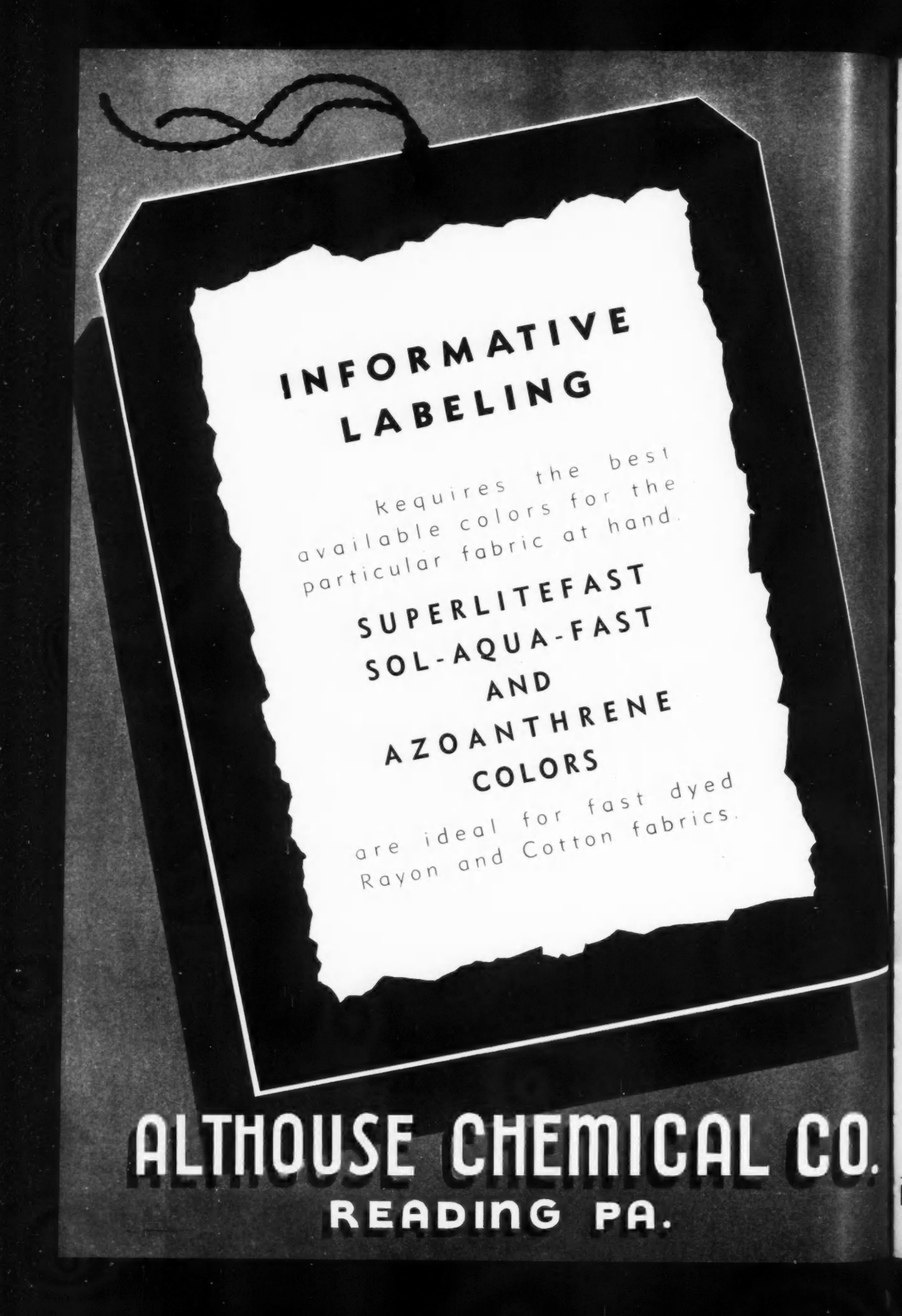
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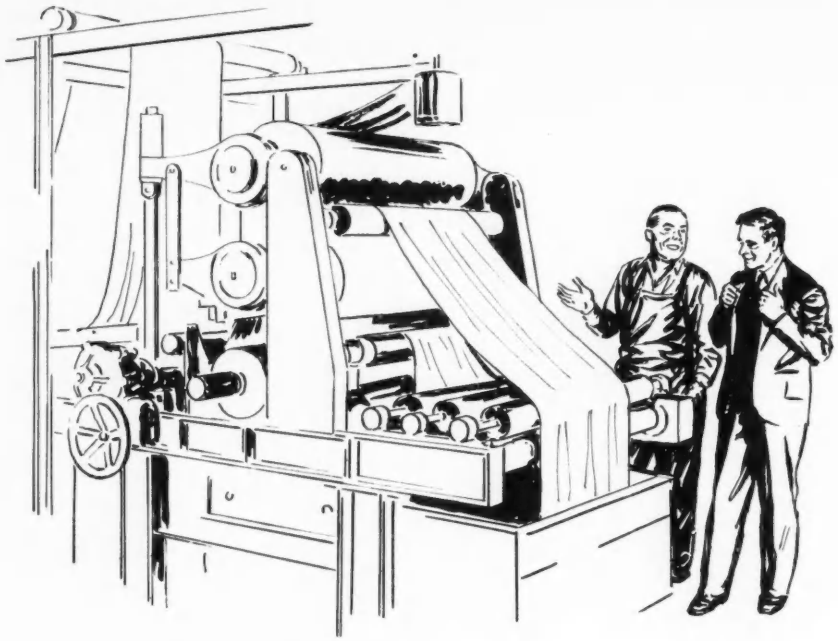

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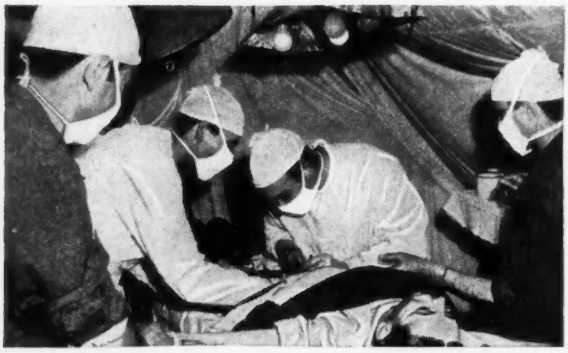
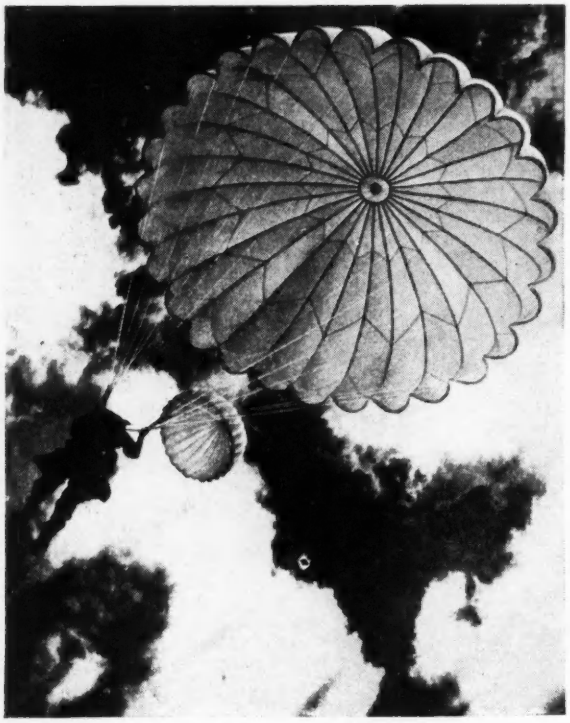


Lower mortality rate of wounded has been brought about by such medicines as sulfa ointments, which are prepared with safe, non-toxic glycerine. Use glycerine in making drugs and cosmetics.

Good eating! Pure, wholesome glycerine is safe in foods and food products. It is used in many kinds of army concentrated foods. Use glycerine in your food processing! You're safe with glycerine!



Hit the nylon! Nylon, used in making parachute shrouds, glider tow lines and other war essentials, is made with glycerine. In many vital war applications, where life is at stake, glycerine is used!

GLYCERINE,
Vital War Material, Now Available to You!

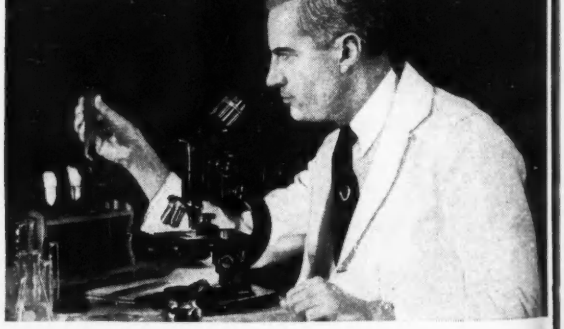
GLYCERINE, time-proven standby of American industry, is now off allocation. There is plenty of glycerine for civilian goods!

War needs for glycerine have been enormous. The Surgeon General's Office, the Medical Corps, the Ordnance Department and many other important agencies recognize the necessity of using *only* glycerine in the making of many vital articles. For a long while war needs came first on all glycerine produced.

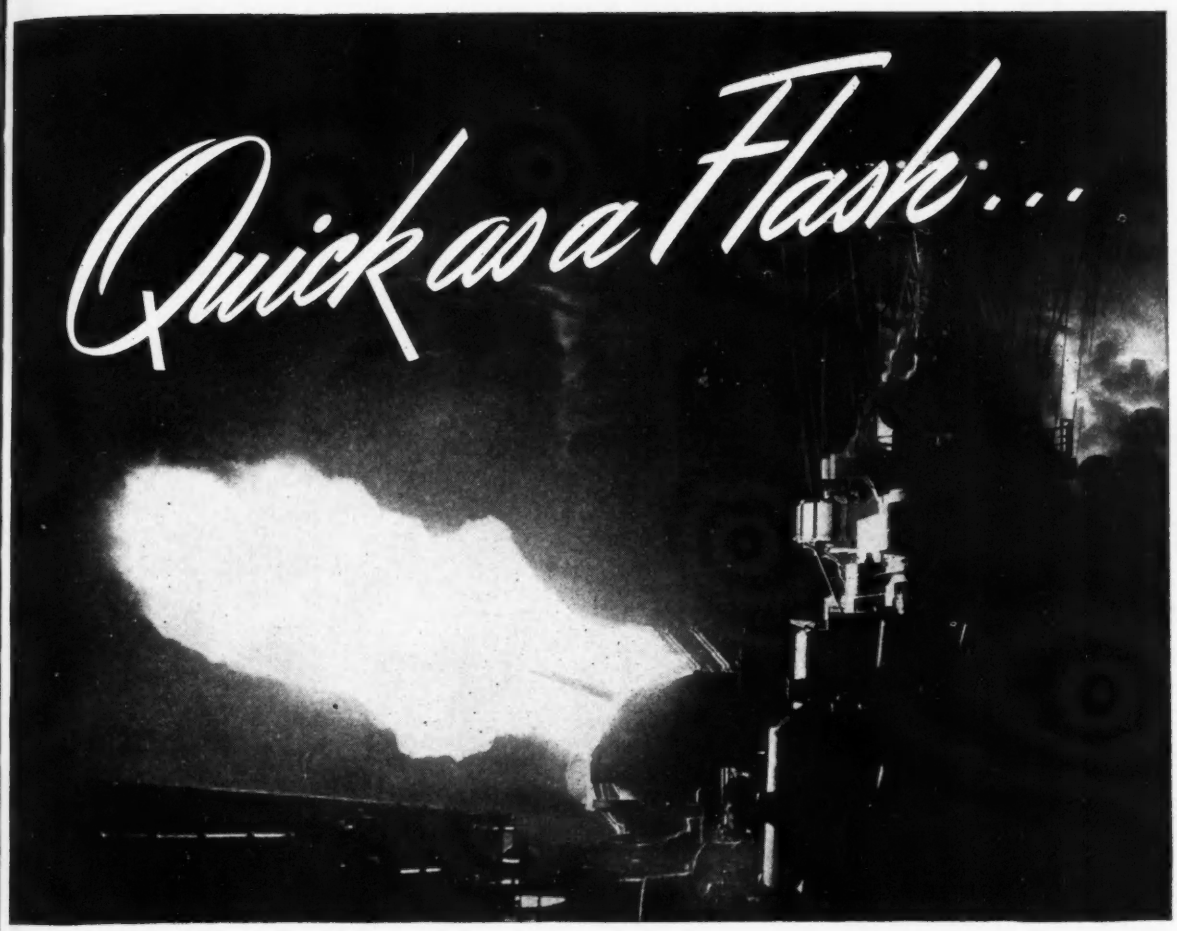
But so successful have glycerine producers been in stepping up production that now there is plenty for civilian goods, too.

Glycerine is not toxic. Now that real glycerine is back, you don't have to put up with substitutes. Get back to safe, dependable glycerine in your present products. And when you plan new ones you'll want to use glycerine instead of substitutes. Send for the free booklet, "Nothing Takes the Place of Glycerine—1583 Uses For It". Glycerine Producers Association, 295 Madison Avenue, New York 17, N. Y.

Safe against gas—thanks to a cellophane bag—made with glycerine. Glycerine is favored in making cellophane. Since it is non-toxic, it is safe to use in cellophane for all kinds of purposes.



Glycerine and you. If you've been using emergency substitutes, you can now come back to safe, time-tested glycerine in making foods and food products, plastics, paints, textiles, drugs, cosmetics, etc.



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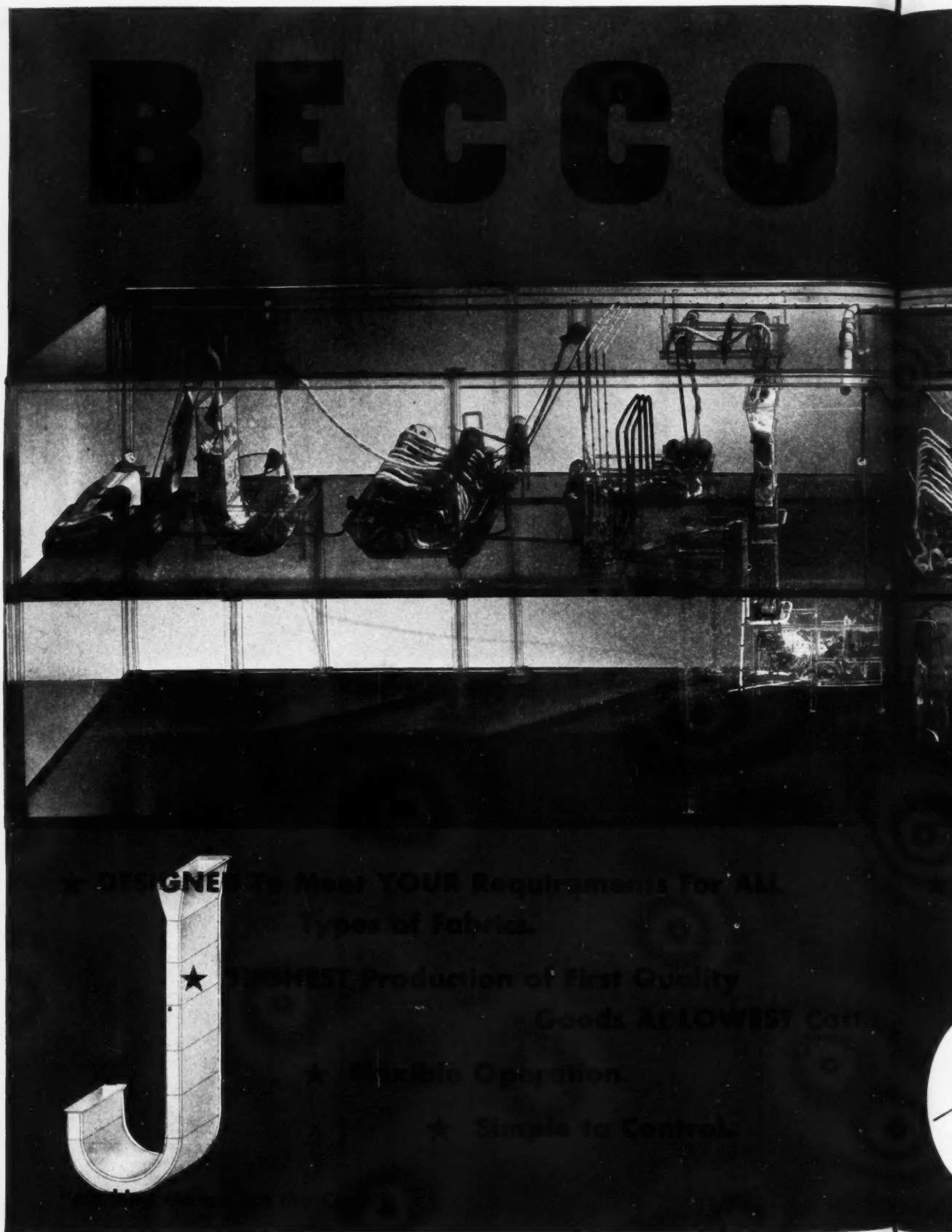
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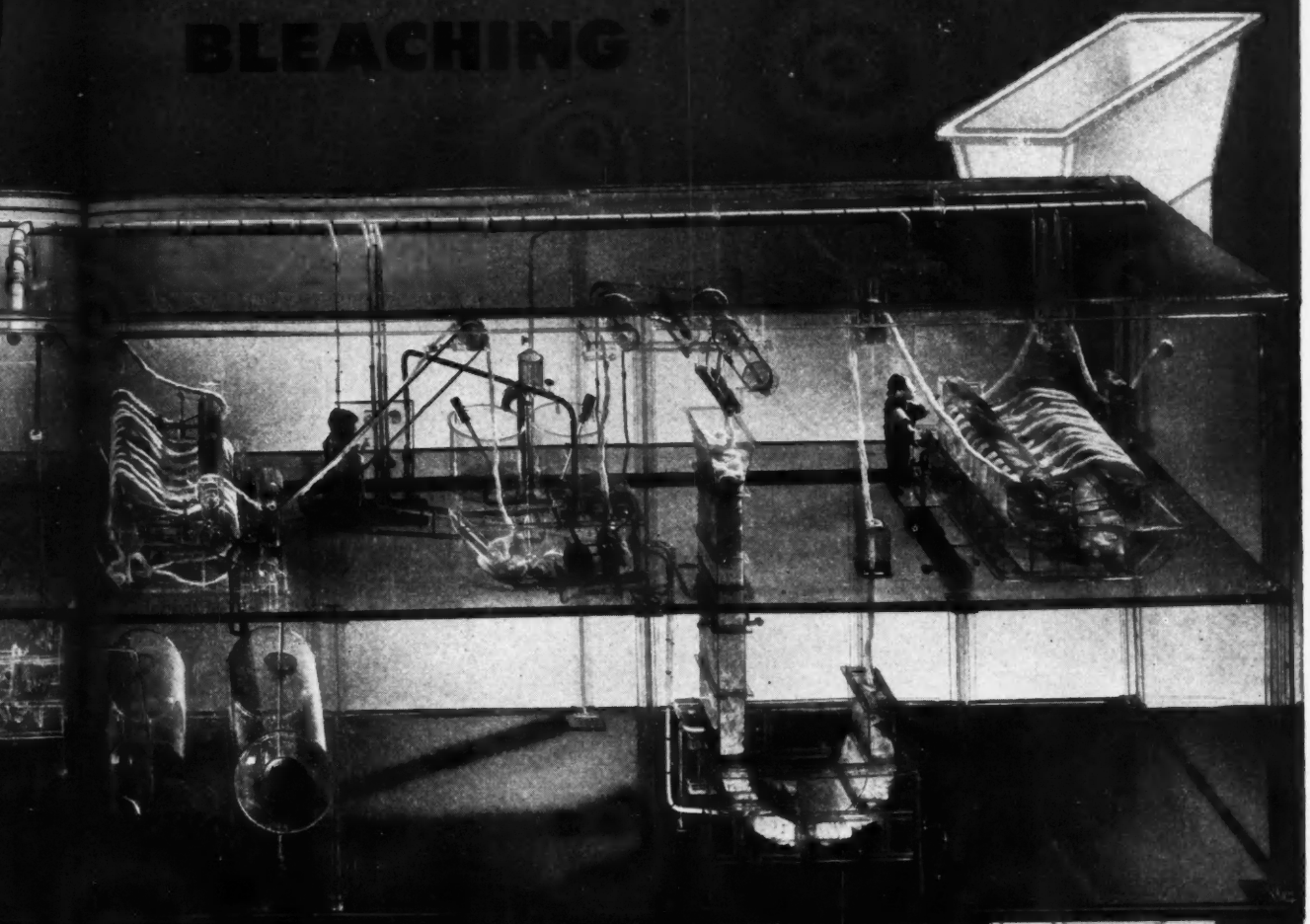

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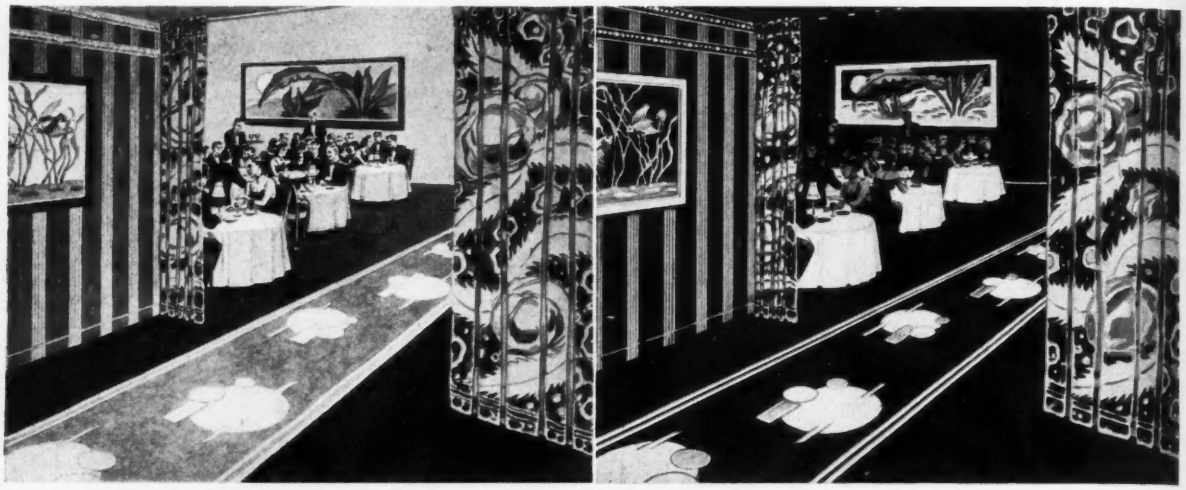


"Glowing" color is introduced into interiors where darkness, or semi-darkness, may prevail — theatres or night clubs, for example, (left) ordinary lighting and (right) "black" light.

"Glowing" Textiles for Decoration in Darkened Rooms

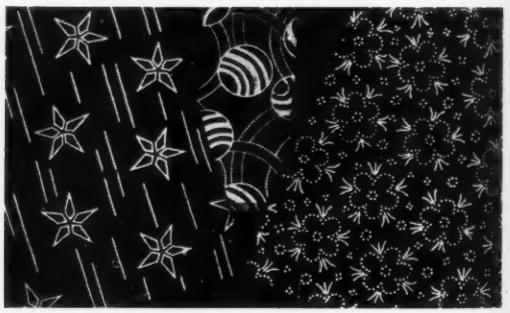
LUMINESCENT TEXTILES— both the Fluorescent and Phosphorescent types — in the form of printed draperies, upholstery, lamp shade coverings, table linen, and other fabrics, are now indicated to be in the post-war interior decoration scheme for use under conditions of darkness, or semi-darkness. These "glowing" textiles will bring color to an otherwise drab interior, as for instance, a home television reception room, which also may be used for movie projection.

Theatres, hotel rooms and cocktail lounges are other logical outlets for luminescent textiles, or such textiles in combination with luminescent paints, paper and plastics. The fact that many new "black" light sources have been developed, and undoubtedly will be available after the war, points more directly to the possibility of extensive use of luminescence in the interior of the future.

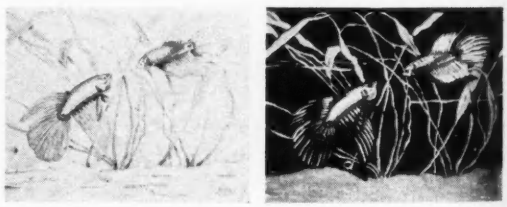
The continued wide interest in phosphorescent adhesive tapes for use as safety markers in the dark during power failures indicates a peacetime market for these "glowing" coated fabrics. These tapes, of course, require no "black" light, being excited to phosphorescence by exposure to any light source.

If you have not already done so, we urge you to look into the luminescent pigment story with the view to answering the question: "How do these colorful pigments fit into our postwar plans?"

We shall be glad to hear from you.



Three swatches of silks printed with phosphorescent pigments.



Colorful, luminescent designs may be printed on textile fabrics, or on an overall background of these colorful "dark-time" pigments, to be used as wall panels or wall coverings — opening a new outlet for postwar textiles. (Left) design as it appears under regular lighting and (right) the same design luminescing in the dark.

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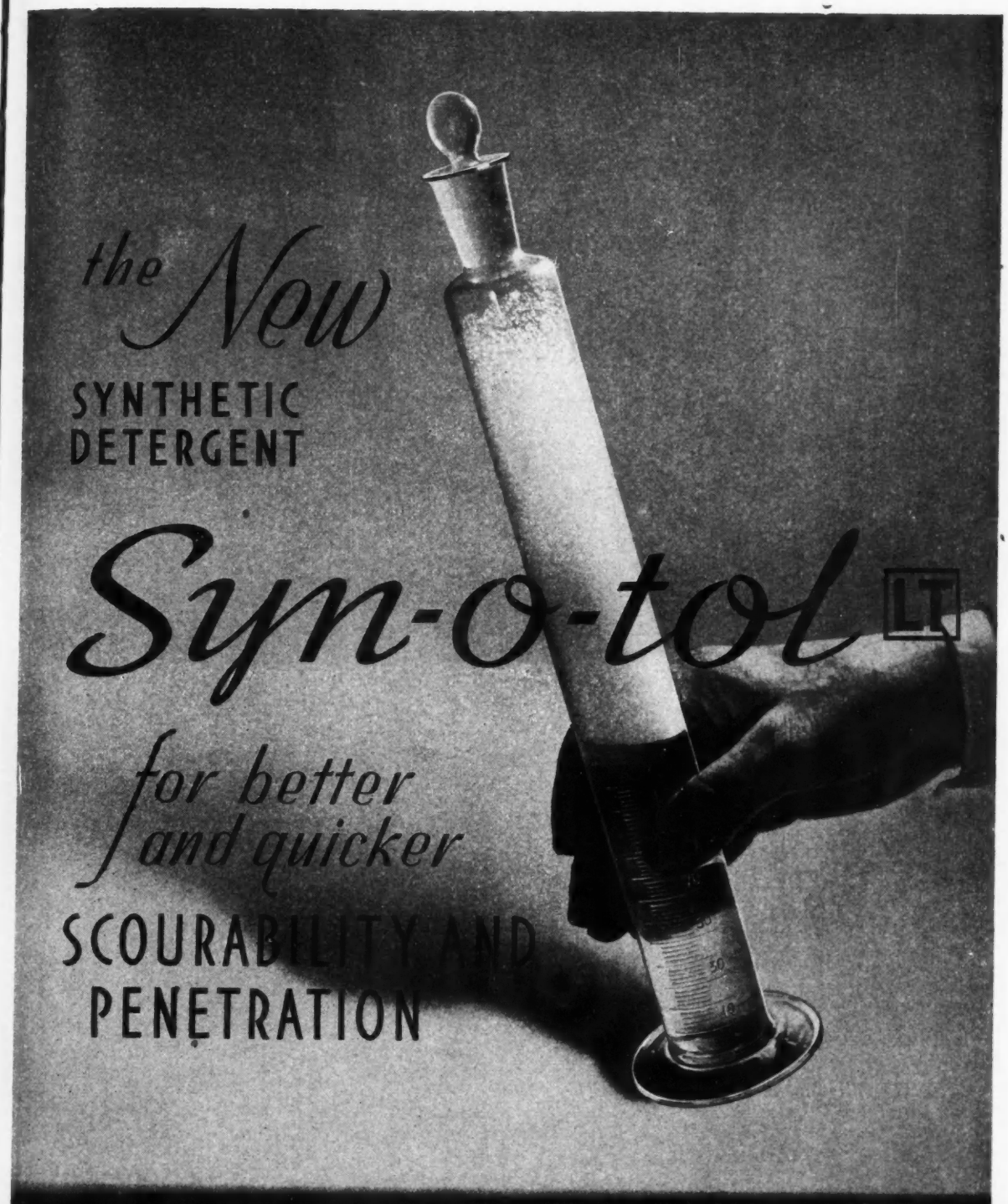

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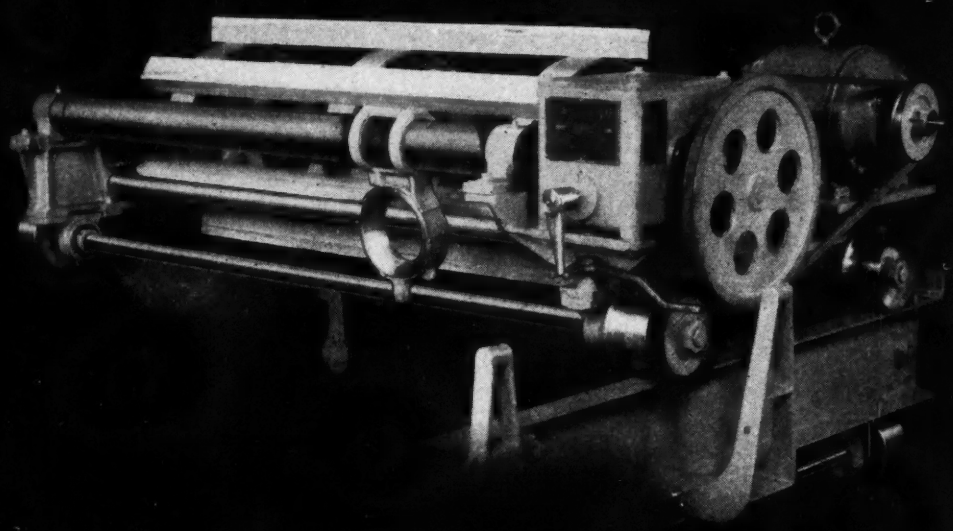

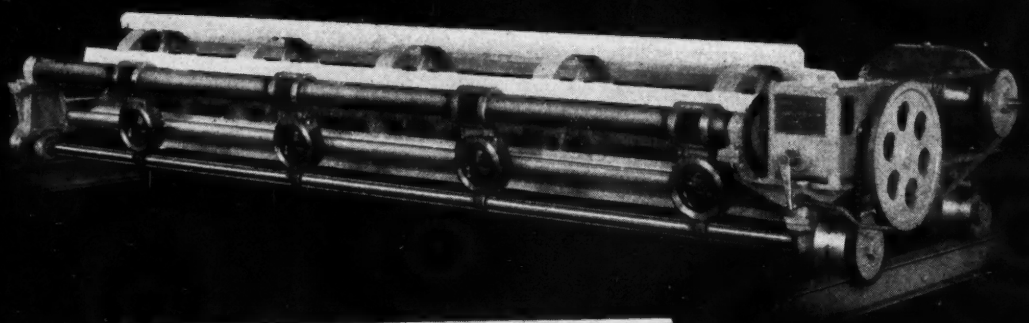

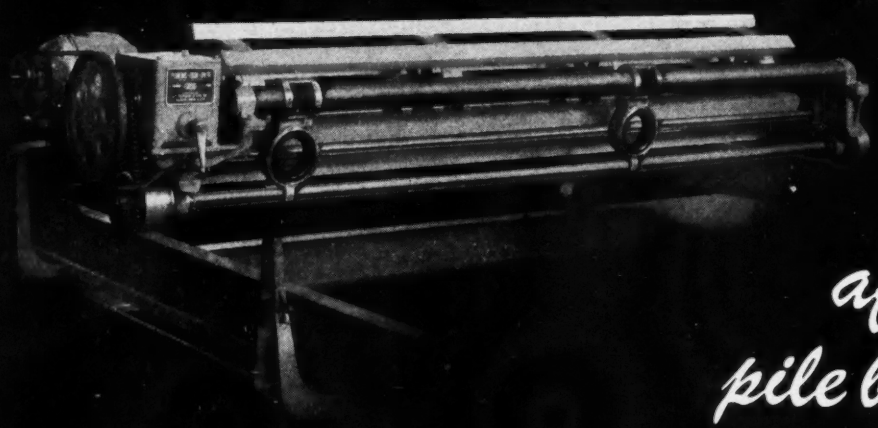

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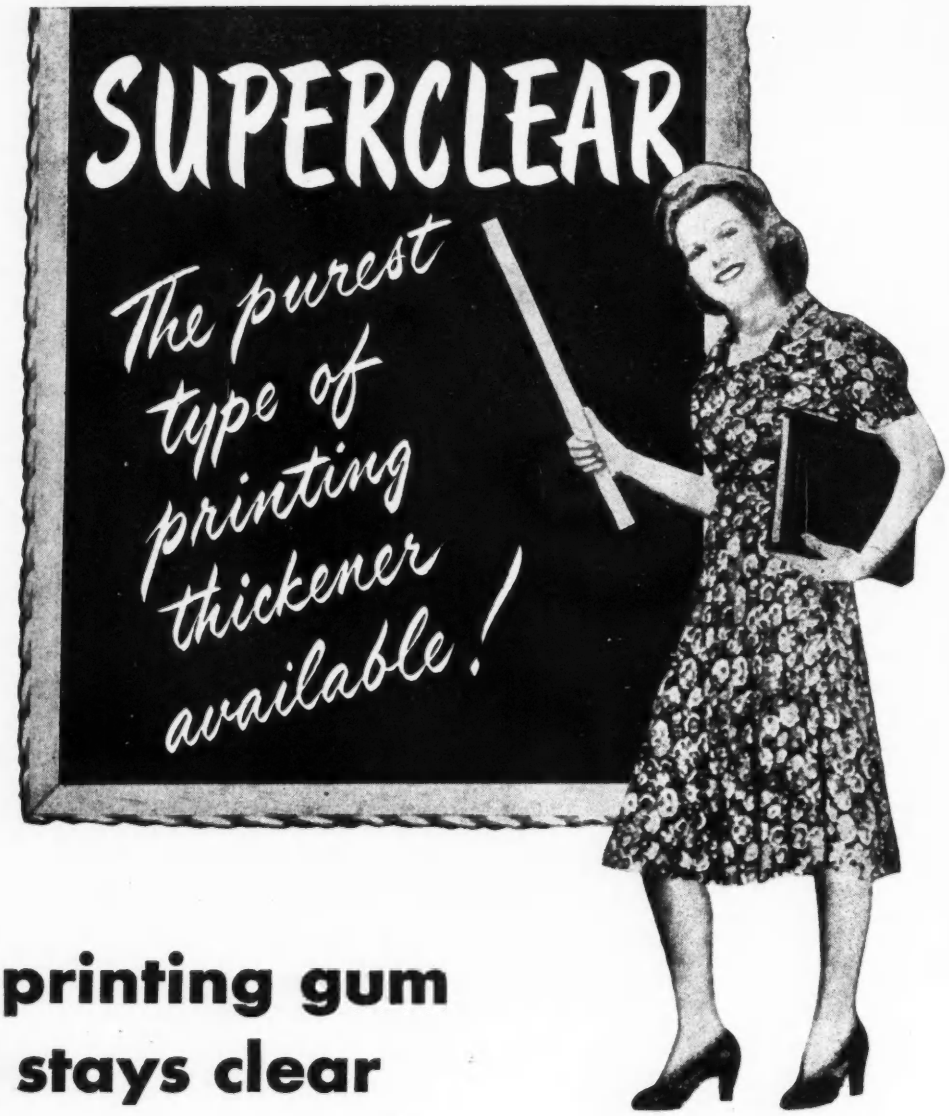

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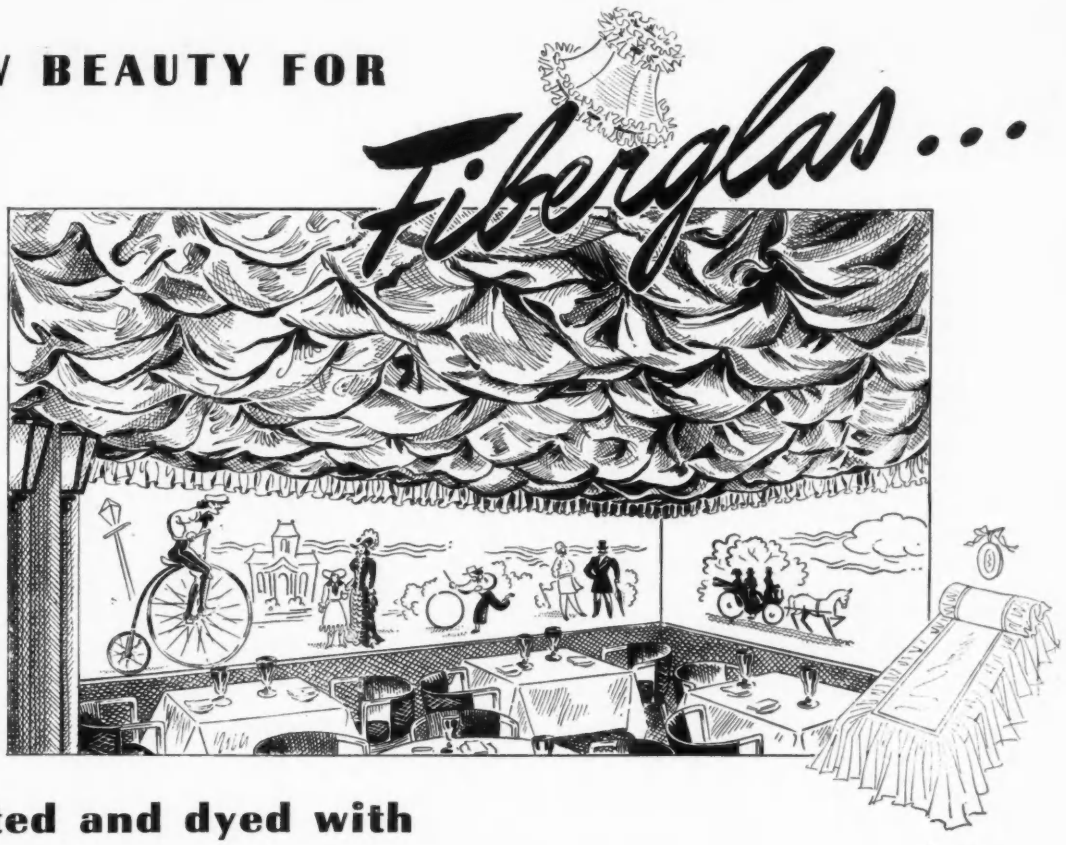

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The said Mr. Ramdeo A. Podar and others are no more interested in the said company and its affairs, and Mr. V. K. Menon is now the Managing Director of the said company.

V. K. MENON, *Managing Director*

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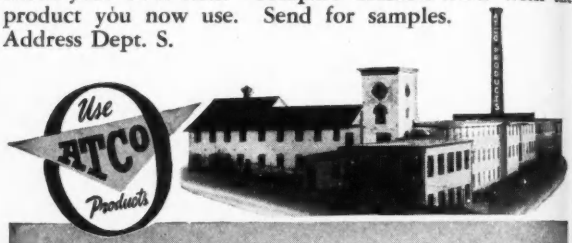

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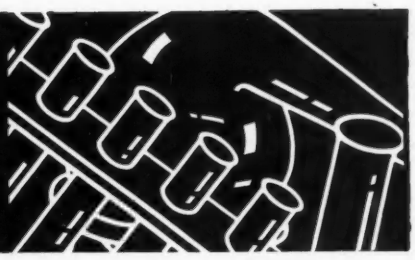

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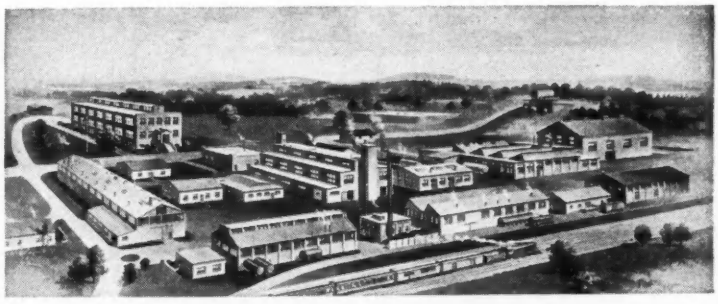

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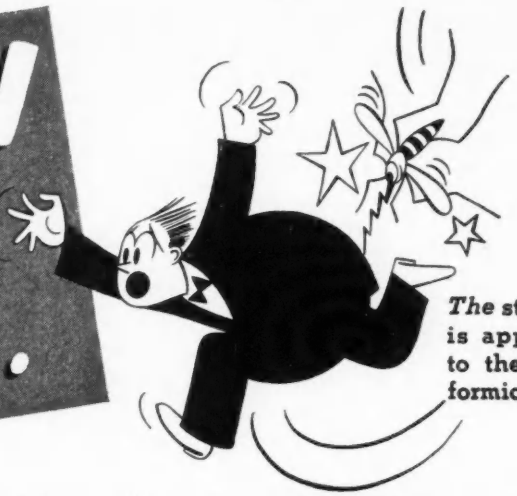
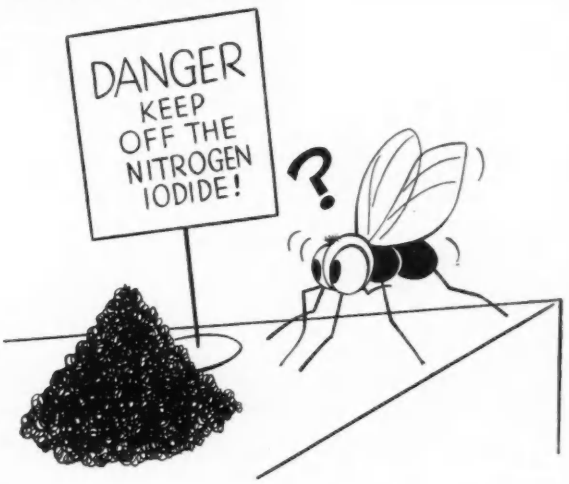


The sting of insects is apparently due to the presence of formic acid.

Perkins discovered Mauve, the first coal tar dye, during research which had for its object the synthesis of quinine.

Kermes, a scarlet dye from an insect similar to cochineal, was known to the Egyptians before the days of Moses.

Textile chemistry is often the most effective way of developing new fabrics, new finishes, new characteristics.



Nitrogen iodide explodes with great violence when dry . . . even the gentle touch of a feather or possibly the tread of a fly is sufficient to explode it.

Rodney deSarro

It has been known since the time of Aristotle that it is possible to obtain drinkable water from the ice of frozen sea water.

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